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No. 21

Compiled by Frederick W. Lee[2]

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1. GRAVITATIONAL METHODS

(1) UN INSTRUMENT TRANSPORTABLE POUR LA MESURE RAPIDE DE LA GRAVITÉ

(A PORTABLE INSTRUMENT FOR QUICK MEASUREMENT OF GRAVITY)

By F. Holweck and P. Lejay

Comptes Rendus de l' Académie des Sciences, Paris,
vol. 190, No. 24, 1930, pp. 1387-1388.

The principles and the construction of the instrument are described. The ensemble of the instrument consisting of two supports provided with levelling screws and levels, two cells, two amplifiers, registering device, dry pile batteries, and four interchangeable pendulums is packed into two small boxes, the whole weight of which does not exceed 40 kilograms. Only a few minutes are required to put the instrument in operation.

Preliminary measurements carried out by the Observatory of Paris during several months have shown that the variations of the elasticity of invar during this time was negligible. The clamping device by which the pendulum is rendered immovable during transportation preserved it well from any injury.

A table shows the periods obtained for the two pendulums from the tests carried out along the base-line Paris-Dunkirk.--W. Ayvazoglou.

(2) DAS PENDEL MIT OSZILLIERENDEM AUFHÄNGEPUNKT

(A PENDULUM WITH OSCILLATING POINT OF SUSPENSION)

By Paul Hirsch

Zeitschrift fuer angewandte Mathematik und Mechanik,
vol. 10, No. 1, 1930, pp. 41-52.

The problem, which is not new, is treated by means of classical mechanics; in each phase, clearness is sought for. If the point of suspension of a pendulum is given a vertical harmonic movement with small amplitude and great frequency, the stability of the lower position of equilibrium increases and the lability of the upper decreases and in case of sufficiently strong oscillation changes into stability. The conditions change if the general case is not considered, but the oscillation is assumed to be in a direction inclined to the vertical. In this case there are two stabile and two labile positions of equilibrium determined by the roots obtained from an equation of the fourth degree; only one value for each position exists in case the oscillation is weak.

In case of vertical oscillation the two labile and one stabile positions of equilibrium coincide in the upward direction. Preliminary calculations on the effect of a mathematical pendulum are made; two generalizations are discussed: 1. Elliptical oscillation. The point of suspension of the pendulum is supposed to perform harmonic oscillation of equal frequency in two directions--that is, it describes an ellipse. In this case the pendulum has usually six positions of equilibrium. 2. Linear oscillation of a physical pendulum is a symmetrical position. A generalization results from the discussion. The following cases are examined: 1. Linear oscillation of a physical pendulum. 2. Circular oscillation. For this special case of the elliptical oscillation there results a duality with the linear oscillation--that is, a conformity of the positions of equilibrium if the direction of the linear oscillation is interchanged with that of the line perpendicular to the plane of the circular oscillation and the words "stabile" and "labile," as well as "upper" and "lower", are substituted one for another. 3. Elliptical oscillation. Linear oscillation which does not proceed harmonically but with a constand velocity and a sudden reversal of it can be easily treated in the same way. Only the results obtained in this case are given. The direction of all the positions of equilibrium can be calculated by means of a simple approximate proceeding. The frequency with which the pendulum can oscillate around the stabile positions of equilibrium is explained.--Author's abstract translated by W. Ayvazoglou.

(3) DIE INVARIABILITÄT UND ABSTIMMUNG VON MINIMUMPENDELN

(THE INVARIABILITY AND ADJUSTMENT OF MINIMUM-PENDULUMS)

By E. Kohlschütter

Zeitschrift fuer Geophysik, vol. 6, No. 8, 1930, pp. 466-476.

The question raised by O. Meisser concerning the development of a formula for the variability of invariable minimum gravitational pendulums produced by small knife-edge displacements or reasons having a similar effect is formulated and applied to pendulums which can be manufactured practically. A table for this variability is calculated. Formulas for calculation and adjustment of cylindrical minimum-pendulums are derived.--Author's abstract translated by W. Ayvazoglou. Note: The article is followed by two brief discussions, one written by O. Meisser under the heading: Bemerkung zu der Arbeit "Die Invariabilität und Abstimmung von Minimum-pendeln" by E. Kohlschütter (Remarks on E. Kohlschütter's work "The Invariability and Adjustment of Minimum Pendulums); the other is an "Answer" (Erwiederung) written by E. Kohlschütter.

(4) NUOVI CALCOLI DI INFLUENZE GRAVIMETRICHE DI TERRENI SUPERFICIALI E PROFONDI

(NEW CALCULATIONS ON THE GRAVIMETRICAL INFLUENCE OF SUPERFICIAL AND DEEP MASSES)

By Arnaldo Belluigi

Ergänzungshefte fuer Angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 141-148.

The author establishes new calculations on the gravimetric influence of superficial and subsurface disturbing masses. He refers to some of his previous investigations concerning topographic correction and develops a new process in connection with it. The author tries to solve the question of the influence of disturbing masses at a depth by approximation of imaginary disturbing bodies to the real ones. A special solution for an imaginary body of the form of a parallelepiped is given.--Author's abstract translated by W. Ayvazoglou.

(5) VERGLEICH DER AUFZEICHNUNGEN ZWEIER GALITZINPENDEL MIT VERSCHIEDENER EIGENPERIODE

(COMPARISON OF RECORDS OF TWO GALITZIN PENDULUMS WITH DIFFERENT NATURAL PERIODS)

By Helmut Landsberg

Gerlands Beiträge zur Geophysik, vol. 27, No. 3-4, 1930, pp. 326-359.

The same component was registered in theTaunus Observatory by two Galitzinpendulums, one with the natural period of 3 seconds and the other of 18 seconds. The records of these pendulums, already discussed by B. Gutenberg in his article "Registration made with two Galitzin-pendulums with different periods," (see Geophys. Abs. No. 13, p. 11), were submitted to a systematic investigation. The advantage of the installation of the instruments consisted of the fact that the starting of the earthquake was very distinctly recorded by the pendulum with short periods; clear records of the after-shocks were obtained by this pendulum also. Ninety-four earthquakes were investigated and it was proved that waves of long periods never arrived before the waves of short periods.

In more than 50 per cent of all the cases there were no waves of long period in P; they appeared there only in the later phases. The possibilities of the origin of a time difference of from one-half to 2 seconds in P of both kinds of waves are discussed. The phase maximum of long-period pendulum in P was generally delayed if compared with the short-period pendulum. The ratio of maximum amplitudes of the P-phase in both pendulums shows a distinct dependence on the focus-distance.

There were unknown groups of short waves observed between P and S during most earthquakes; they were used for the construction of some travel-time curves, of course with restrictions. A general comparison of the appearance of long and short waves at single phases of earthquakes was carried out and it was proved that almost all the groups which were longitudinal on their whole course have shown waves of short periods. The question of the appearance of short periods in changing waves is discussed, and a general view on the proportion of the different phases in the two pendulums is given.

Microseisms of only 4 to 10 secondswere investigated because only these earthquakes were recorded by both pendulums. A dependence of the periods in the two pendulums could not be established. Concerning the yearly course of the periods, it was found that the long and the short periods were recorded at the same time in summer as well as in winter, and only the amplitudes which belong to the single waves were changed. The influence of the English and Norwegian surf was investigated, and it was again established that microseisms and surfs always change in the same sense.--Author's abstract translated by W. Ayvazoglou.

(6) GEOLOGICAL INTERPRETATION OF MAGNETOMETRIC AND GRAVIMETRIC OBSERVATIONS WITH THE AID OF APPARATUS FOR MECHANICAL CALCULATIONS (IN RUSSIAN)

By G. Gamburtzeff

Journal of Applied Physics, Moscow,
vol. 5, No. 3-4, pp. 227-235, and vol. 6, No. 1, pp. 62-67, 1929.

The author describes mechanical instruments by which the deviations of the magnetic potential and gravimetric potential of an infinitely long homogeneous cylinder of any section can be calculated. The whole course of the distribution curve of the force of gravity perpendicular to the peripheral line of the cylinder can be graphically represented directly by encircling the borders of the cross section of the cylinder.

Owing to the well-known relation between the magnetic potential and gravitational potential (in case of a homogeneous magnetization) the apparatus can serve for geological interpretation of both gravimetric and magnetic observations. Theoretical calculation for constructing the instruments and graphical designs of them are given.--W. Ayvazoglou.

2. MAGNETIC METHODS

(7) BEZIEHUNGEN ZWISCHEN GEOLOGISCHEN UND ERDMAGNETISCHEN VERHÄLTNISSEN

(RELATION BETWEEN GEOLOGIC AND EARTHMAGNETIC CONDITIONS)

By F. W. Pfaff

Zeitschrift fuer Praktische Geologie,
vol. 38, No. 9, pp. 129-135 and No. 10, pp. 154-159, 1930.

Wettergebirge has been chosen by the author for investigation of the way in which the earthmagnetic values of declination, horizontal intensity, and inclination are affected by the geological structure of the upper earth layers. The best way to understand the correlation between the geological and magnetic conditions is to compare the values of the magnetic elements which can be expected under normal conditions with those obtained by measurements. In a table accompanying this article Pfaff gives the measured and normal values of the magnetic elements as well as the differences between these values for a few formations. At the end of the table the mean values of the differences are calculated for shell limestone, belemnite limestone, raibler and haupt dolomite.

The second part of the article deals with influences upon the values of the magnetic elements in the region described in connection with:

The faults and lines of disturbances,

The influence produced by a syncline,

The reduction for a level terrane,

The explanation of the small values for H and I in the northern Mittenwald,

The influence caused by the great lines of disturbance.

In conclusion the author says that, if the measured values only are compared, the direct influence of the geological conditions upon the values of the magnetic elements can hardly be noticed, but they become noticeable when corrected (specific magnetization) for the topographic and geographic positions, as well as for the thickness of the layers (geological and tectonic height); thus the following conclusion has been drawn: For most of the stations of the region in which the measurements were carried out, the specific magnetization agreed with the tectonic height.--W. Ayvazoglou.

3. SEISMIC METHODS

(8) PROGRESS OF SEISMOLOGICAL INVESTIGATIONS IN THE UNITED STATES

By N. H. Heck

U. S. Coast and Geodetic Survey, Special Publication No. 167, 14 pp.

In this pamphlet the author gives a brief description of the progress of seismological investigations in the United States covering a period from July 1, 1927, to January 1, 1930. Attainments made during this period affected the following problems of seismology:

1. Installation of high-grade instruments;
2. Development and perfection of new types of instruments;
3. Expansion of programs of local investigations in regions more frequently subject to earthquakes;
4. Expansion of programs of teleseismic investigation;
5. Attack on the engineering, insurance, and other practical phases of the problem;
6. Unprecedented public interest in the subject.

The pamphlet is divided into two parts; the first deals with the work of the Coast and Geodetic Survey; in the second a summary of earthquake investigations in the United States made also by other institutions is given.

Two maps showing (1) the seismological stations of the United States and adjacent Canada and (2) important seismological stations in the United States and regions under its jurisdiction are added.

A list of teleseismic stations distributed in the United States concludes the article.--W. Ayvazoglou.

(9) SEISMISCHE UNTERSUCHUNGEN AUF DEM PASTERZEGLETSCHER

(SEISMIC INVESTIGATIONS ON THE PASTERZE GLACIER)

By B. Brockamp and H. Mothes

Zeitschrift fuer Geophysik, vol. 6, No. 8, 1930, pp. 482-500.

The authors describe the seismic investigations carried out by them in August, 1929, on the Pasterze Glacier (Eastern Alps). The purpose of the work was as follows:

1. To make seismic measurements at fixed places of the glacier basin.
2. To collect material, following the direction of the work established by the Geophysical Institute of Göttingen, for the study of special questions connected with the propagation of waves.

Determinations on the following waves were made:

1. Longitudinal waves, V_p = 3,580 meters per second.
2. Transversal waves, V_s = 1,670 meters per second.
3. Longitudinal waves which passed through the rocks situated below the glacier, V_{p1} = 5,850 meters per second.
4. Longitudinal and transversal waves which passed through the ice at the lower border of the ice, U_p and U_s.
5. Reflected longitudinal waves, R_I and R_{II}.

The P^1-waves and the U_p-waves were used for the determination of the mean depth, and the R_I-waves were used for calculation of single values of the depth.

They served for the construction of longitudinal profiles and cross profiles of the glacier.

A series of figures showing these profiles is given. More than 70 seismograms were taken. Nine of them are shown in the figures.--W. Ayvazoglou.

(10) DAS IMPULSFELD DER PRAKTISCHEN SEISMIK IN GRAPHISCHER BEHANDLUNG

(THE IMPULSE FIELD OF PRACTICAL SEISMICS TREATED GRAPHICALLY)

By E. A. Ansel

Ergänzungshefte fuer angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 117-136.

The author derives graphical methods by which the strata of the subsoil, the inclination of the strata and the discontinuities of the strata can be determined in more or less simple cases with the aid of the travel-time curve.

The great importance of the "contact curve" for the graphical treating of the impulse field is mentioned, and the construction of this curve from the data obtained for the travel-time curve is explained.--W. Ayvazoglou.

(11) ERGEBNISSE SEISMISCHER UNTERSUCHUNGEN UEBER DEN SCHICHTENAUFBAU VON NORD DEUTSCHLAND

(RESULTS OF SEISMIC INVESTIGATIONS MADE OVER THE STRUCTURAL LAYERS IN NORTH GERMANY)

By O. Barsch and H. Reich

Ergänzungshefte fuer Angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 165-188.

The article is divided into the following three parts: (1) General remarks. (2) Seismic investigations near Dobrilugk. (3) Seismic investigations in Priegnitz and Schleswig-Holstein.

Diagrams showing the travel-time curves and the seismograms obtained from the investigations in the regions mentioned above are given.

Based on the results from this work in various regions of North Germany the authors determined the values for the velocities of wave propagation in a series of rocks:

Dry sandy diluvium	700 to 1,000 meters per second.
Watered diluvium	1,000 to 1,700 meters per second.
Marly diluvium	
Sandy-clayer Miocene	
Clayey-sandy Oligocene	
Marley Eozoic (?)	1,800 meters per second.

Chalk - - - - - - - - - - - - - - - - -	2,100 to 2,250 meters per second.
Productive carbon (clay slate and sandstone - - - - - - - - - - - -	about 3,800 meters per second.
Cambrian (clay slate and quartzites)	about 5,000 meters per second.

A few other layers with V = 3,000 to 3,600 meters per second, found at different depths, are mentioned but with much caution. In spite of their reserve, the authors seem to be of the opinion that the deeply situated layers of discontinuity, which for all the profiles given in the article have an almost horizontal position, may be considered transgressive layers. While such a transgressive layer, covered with chalk, was found in Priegnitz at about 800 meters in depth, in Schleswig-Holstein the chalk was missing and the depth of the transgressive layer was only about 600 meters.

The real reason for the great magnetic and gravimetric disturbances in North Germany could not be established with certainty by seismic methods. Therefore it may be concluded that these rocks, at least as far as the regions investigated are concerned, are probably situated at a depth greater than [illegible],000 meters.

The well-known subterranean structure of the region under investigation was of great assistance to the authors in studying the course of the seismic waves, as well as other problems of applied seismics important from both practical and theoretical viewpoints.--Author's abstract translated by V. Ayvazoglou.

(12) À PROPOS D'UNE ONDE LONGUE DANS LA PREMIÈRE PHASE DE QUELQUES SÉISMOGRAMMES

(CONCERNING ONE LONG WAVE APPEARING IN THE FIRST PHASE OF SOME SEISMOGRAMS)

By O. Somville

Gerlands Beitrage zur Geophysik, vol. 27, No. 3-4, 1930, pp. 437-442.

In this article the author mentions a very striking long wave of a period of about 24 seconds which was registered in some seismograms obtained in the Observatories of Taunus, De Bilt, and Uccle by means of Galitzin pendulums with long natural periods during the earthquakes observed in Italy in 1928, 1929, and 1930.

This wave, which the author calls the PL wave, has so far been observed only in connection with the Italian earthquakes. Thus, before trying to give an interpretation on the nature of this wave the author raises the following questions: Can the PL-wave be observed in other directions than the northern, as in Italian earthquakes? Has it been observed in other cases? He adds that, of course, the answer to the questions may be difficult, as there are only a few stations working with seismographs with long natural periods.

In the last figure the author has drawn, based on observations mentioned in this article, a first curve of times of propagation of the PL-wave for distances from Δ = 500 kilometers to Δ = 1,400 kilometers.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(13) RESISTIVITY MEASUREMENTS OF OIL-BEARING BEDS

By F. W. Lee and J. H. Swartz

U. S Bureau of Mines, Technical Paper 488, 1930, 12 pp.

In the introduction to this paper the authors propose to show the results of experiments in oil-bearing territory, using electrical resistivity methods. The development of these methods is briefly mentioned.

Under the heading of "Partition Theory" two methods of approach for determining the character of subterranean formations are evolved. In the first class the authors place a theoretical discussion of parallel beds with different resistivities in each one, as discussed by Hummel, and in the second the results of field observations without complete mathematical analysis.

To test this theory a district in Allen County, Ky., was selected. The oil here is at an extremely shallow depth and therefore all conditions are favorable for discovering oil as outlined in the article. A geological description of territory is given and factors controlling the accumulation of oil in this area, as well as the groups into which the oil sands of Allen County fall, are mentioned. The process of taking measurements and apparatus used for observations (Rooney-Gish apparatus) is described. The contour of the testing site is shown in a figure.

The results of measurements carried out at three stations are illustrated by diagrams. The work was carried out in December, 1929.

In conclusion the authors say that although the results of these tests show favorable reactions under certain circumstances, they require much more work to establish their validity; thus this paper may serve as an experimental guide to persons interested in locating oil at shallow depths, and continued application of these methods is necessary to improve their technique before very deep investigations of oil formations can be made with reliable results.

A list of books relating to electrical resistivity methods is added.-W. Ayvazoglou.

(14) THE USE OF GEOELECTRICAL METHODS UNDERGROUND

By G. P. Haller

The Mining Journal (Phoenix, Arizona), vol. 14, No. 9, 1930, pp. 11 and 30.

In this article the author discusses the application of geoelectrical methods of prospecting to underground investigation by which the miner is give chance to obtain more definite information as to the presence of ore before urther mining exploration is begun.

The underlying principles of the method are mentioned briefly and he effects obtained by geoelectric measurements in different cases by which he determination of the location of existing ore bodies is possible are shown n a series of figures. The necessity of testing the conductivity of samples f the minerals which occur in the area to be investigated before starting he actual survey is mentioned. Illustrations obtained from geoelectrical inestigations of copper mines accompany the article.

In conclusion Haller says that the real benefit to be derived by the ining engineer and the geologist from this branch of geoelectrical investigaion is evidenced by practical experience, but he adds that although of great alue in capable hands the results can be more damaging than helpful in the ands of the inexperienced, as only a thoroughly trained expert in geoelectrial methods is able to compute the results and to interpret the obtained data eologically and with exactness. Furthermore, a close cooperation with the eologist is essential.--W. Ayvazoglou.

(15) GEOPHYSICAL STUDY PREDICTS ROCK CONDITIONS AT TUNNEL SITE

By E. E. Carpenter and E. G. Leonardon

Reprint from Engineering News-Record, September 4, 1930.

Lack of knowledge of underground conditions at the sites of certain ngineering works, especially dams and tunnels, affects construction methods nd costs to such an extent that advance information in regard to rock formaion and water conditions is of the utmost value.

No attempt is made in this article to detail the technique of the eophysical exploration, and only a brief explanation of the theory of rock esistivity upon which the electrical method is based is given.

The authors describe the electrical exploration work at Bridge River unnel carried out in the summer of 1928.

The constitution of the rocks encountered along the tunnel which have een bored through since are indicated, proving the accuracy of the results btained by examination of the resistivities of the rocks.--W. Ayvazoglou.

(16) ON THE RESULTS OF THE ELECTRICAL PROSPECTING IN THE REGION OF NOVO-GROZNY (IN RUSSIAN)

By A. Shaiderov

Azerbeidjanskoe Neftianoe Khoziaistvo,
vol. 10, No. 9, 1930, pp. 78-85

After a brief explanation of the principles of electrical methods of prospecting, Shaiderov describes the methods carried out for the electrical investigation of the geological structure in the region of Grozny in the year 1929-30.

The following methods were applied:

1. The resistivities of rocks deposited at certain depths were determined by construction of electrical profiles.

2. The resistivity of rocks at different depths was determined by electrical boring.

3. The extension of rocks and their inclination was determined by applying stakes.

For the construction of profiles corresponding to different depths three different distances (150, 600, and 1,000 meters) between the electrodes were applied.

Based on the favorable results of investigation, which agreed entirel with the known geological data of the region, the author draws the conclusion that electrical methods of prospecting can be applied with advantage in case the horizons under investigation have distinct electrical characteristics.

The article is illustrated by the following maps:

1. A map showing the character of the electrical profiles for distances of 150 and 1,000 meters between the electrodes.

2. A map showing the results of electrical measurements at a depth of from 150 to 200 meters.

3. A map showing the results of electrical measurements at a depth of from 20 to 30 meters.

4. A section and profile along the line of shafts.

5. A map of vectors of inclination of the rocks.

W. Ayvazoglou.

(17) RESULTS OF SOME RECENT GEOPHYSICAL TESTS

By L. H. Henderson and V. P. Pentegoff

Reprint from The Mining Journal, Phoenix, Arizona, 3 pp.

Based on the accompanying maps and figures, the authors discuss a series of problems solved by electrical methods of prospecting:

1. Map showing resistivity survey of Silver Monument Mine, Chloride, N.M.

2. Map of detailed electrical survey for Spruce Mountain Mining Co., Sprucemont, Nev.

3. Details of the electrical survey of the Silver Plume property of Minaret Consolidated Mines Co., Cananea, Sonora, Mexico.

4. Map showing area in which electrical survey was conducted at Chino Mines, Nevada Consolidated Copper Co., Santa Rita, N. M.

5. Comparative profiles of results from electrical survey and drill prospecting at the Nevada Consolidated Copper Co., Chino Branch.

In all the cases the results of geophysical surveys were very satisfactory and agreed with the data obtained by drilling.--W. Ayvazoglou.

(18) AMPLIFICATORI GEOMETRICI DI PICCOLE DEFORMAZIONI DI LINIE DI CORRENTE IN UN SUOLO ARTIFICIALMENTE ELETTRIZZATO

(GEOMETRIC AMPLIFIER OF SMALL DEFORMATIONS OF LINES OF CURRENT IN AN ARTIFICIALLY ELECTRIFIED SOIL)

By Arnaldo Belluigi

Ergänzungshefte fuer Angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 137-140

The author gives the theory of a geometrical "amplifier" by which the small deformations of the lines of current in an artificially electrified soil can be disclosed.

He concludes that these lines can be used for the interpretation of the geoelectrical results.--Author's abstract translated by W. Ayvazoglou.

(19) EINIGE ÜBERSCHLAGSRECHNUNGEN ZU DEN PHASENVERHÄLT-NISSEN IM POTENTIALFELD BEI GEOPHYSIKALISCHEN BODENUNTERSUCHUNGEN MIT WECHSELSTRÖM MITTLERER FREQUENZ

(SOME CALCULATIONS CONCERNING THE PHASE-RATIO IN A POTENTIAL FIELD DURING GEOPHYSICAL INVESTIGATION OF THE SOIL WITH ALTERNATING CURRENT OF MEDIUM FREQUENCY)

By W. Heine

Ergänzungshefte fuer angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 156-164

With the aid of the approximate formula derived previously, the author calculates the phase displacement between two lines of current in media of unequal electrical conductivity for different values of conductivity.

The dependence of the phase displacement on the absolute values of the specific gravities of the two media is proved.

The difference in phase displacement between the lines of current placed at 1 and 10 meters distant from the deposit, the effect of this difference for measurements of the potential lines being the highest in case of minimum width, obtains higher values only if one of the two media has a specific resistance of the order of from 10^5 to 10^6 ohms, while in case of lower or higher values this phase difference remains very small. This agrees with experience. By using an approximate proceeding the author derives and calculates also the phase displacement resulting from the change of current density along the central perpendicular line drawn on the line connecting the electrodes ("zero" potential line).--Author's abstract translated by W. Ayvazoglou.

(20) DAS ELEKTRISCHE UND MAGNETISCHE FELD UM EINEN "ERDSTRAHLER"

(THE ELECTRICAL AND MAGNETIC FIELD AROUND A "DIPOL")

By Herbert von Ludwiger

Ergänzungshefte fuer angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 189-226.

Contents of the article:

Introduction: Purpose of the work.

Description:

Chapter 1. The elliptically polarized alternating field examined at one point of the field measured.

Chapter 2. The measurements, the terrane on which the measurements were made, and apparatus.

Chapter 3. Summarized representation of the measured data.

Chapter 4. Physical meaning of the curves.

The article deals with measurements of the electromagnetic alternating field around a dipol in a medium of poor conductivity. In case of alternating currents of the tone-frequency character, the normal field at the point of measurement was found to be an elliptically polarized rotation field.

Thus the measurement proceeding required the taking into consideration of the time necessary for the flow of the current within one period of the alternating current produced. Therefore, at each point of measurement, the electrical field inside of the soil, as well as the magnetic field above the soil, was measured for each series of azimuths, with regard to the amplitude and phase, for two quadrants around a dipol of one-fourth square kilometer; the voltage branched off from the excitation served as a comparison voltage for the phase and the amplitude. The measured amplitude curve can, as proved by mathematical calculation, be replaced by a "two-circle-diagram" from which the azimuth, phase, and amplitude of the major axis of the oscillation ellipse can be determined. The ratio of the axes can be determined from the course of the phase with the aid of a simple mathematical relation.

According to geological investigation, the subsoil of one of the quadrants consisted of limestone deposited horizontally.

Eighty-four points of measurements distributed according to a polar coordinate scheme were selected here. The second quadrant was characterized by a tectonic disturbance of the "Kleperspalte," a water-conducting Keuper-graben in the midst of shell limestone. Forty-five points, distributed according to the rectangular coordinate scheme, were measured here.

The following results were obtained from measurements:

1. Lines of equal maximum amplitude for the electrical, as well as magnetic components of the field, are circles around the dipol; the circular form is influenced by the tectonic disturbances only if these disturbances are in connection with strong difference in conductivity.

2. The electric field of the dipol is linear only at the points situated at the prolongation of the dipol axis and its normals passing through the dipol; in all the other points the field is elliptically polarized. Lines of equal ellipticity are closed curves. Lines of equal ellipticity of the horizontal magnetic field are parabolas.

3. The electric current spreads out in the ground in the form of a wave extending from the dipol with a constant velocity of propagation, similar to the phenomenon of the transverse wave observed previously in a cable. The phase conditions in the main direction of the current are, owing to the ellipticity of the field, of no physical importance; lines of equal phases for fixed components, given by the coordinates of the dipol, were calculated and drawn; for the phase φ_z (vertical phase) and φ_y (component in the direction of the dipol-normal) the drawing resulted in circles around the dipol. From φ_y resulted a transverse wave twice as long as from φ_z.

4. Clear information on the tectonic of the subsoil could not be obtained from the results of the amplitude measurements and phase measurements carried out with probes, owing to a very strong influence of the heterogeneity of the surface of the soil.

5. From the geophysical viewpoint the elements of the magnetic field, a, φ_y, φ_z, could be evaluated the best, as for these elements the lines of connection of equal values in an undisturbed field were represented by concentric circles around the dipol; or in other words their value was proportional to the distance from the dipol.

6. Deposits of different conductivity cause disturbances of the normal course of the field, the phase curves reacting with a much greater sensitivity than the amplitude curves.--Author's abstract translated by W. Ayvazoglou.

(21) DIE GEOELEKTRISCHEN UNTERSUCHUNGEN MIT WECHSELSTROM

(GEOELECTRIC INVESTIGATIONS WITH ALTERNATING CURRENT)

By Wilhelm Geyger

Zeitschrift fuer Hochfrequenztechnik,
vol. 34, Nos. 5 and 6, 1930, pp. 184-190 and 228-233.

Contents of the article:

1. Introduction.
2. Theoretical bases of geoelectrical methods.
3. Principles of measurements used in geoelectrical methods.
4. Direct-current measurements.
5. Alternating-current measurements.
6. Representation of vibration phenomena that occur.
7. Method of the compensation measurement proceeding used.
8. Carrying out of terrane measurements in practice.

Theory and measurement proceedings of the electrical methods of prospecting are discussed, especially those carried out with alternating current of medium frequency of about 500 Hertz.

The author describes a complex "slide-wire alternating-current compensator (Schleifdraht-Wechselstromkompensator) developed by him, by which the determination of the two components of the alternating electromotive force perpendicular one to another (actual component and reactive component) can be determined directly.

Eighteen figures and 33 references complete the article.--W. Ayvazoglou.

(22) THE CONDITIONS FOR PROPAGATION OF ELECTROMAGNETIC WAVES IN THE EARTH ATMOSPHERE (IN RUSSIAN)

By S. Krutschkow

Journal of Applied Physics, Moscow, vol. 7, No. 3, 1930, pp. 61-79.

The results of investigations made by several authors show that the upper layers of the earth-atmosphere consist of oxygen, nitrogen, and helium. It seems that in the regions in which the aurora borealis occurs (altitude 80 - 130 kilometers) a certain part of the oxygen-molecules dissociates into atoms. Spectroscopic examination of the night illumination of the sky proved the existence of this dissociation.

After a discussion of various theories the author concludes that the temperature in the free atmosphere can not be established with certainty. The following are taken as possible temperatures: 180, 190, 200, 210, 220 and 300° the most probable being those from 215 to 300°. Calculations made according to the formulas given in the article result in the conclusion that at altitudes of from 102 to 138 kilometers on, a complete dissociation of oxygen molecules take place. This conclusion has been supported by the results of spectroscopic examinations.

Concentration of electrons calculated according to the formulas given in the article reaches its maximum value (about 3.10^6 electrons per 1 $cm.^3$) at altitudes of from 115 to 168 kilometers. This concentration of electrons is not in contradiction with the results of investigations made on the propagation of electromagnetic waves.

The calculated altitudes of the Heaviside layer agree with the results of examinations. These altitudes depend on the length of the wave, initial angle of the wave, and the temperature of the stratosphere; they vary from 87 to 168 kilometers.--Author's abstract translated by W. Ayvazoglou.

(23) MESSUNGEN DER ANZAHL DER ATMOSPHÄRISCHEN ELEKTRIZITÄTSTRÄGER BEI NIEDERSCHLÄGEN

(MEASUREMENTS OF THE NUMBER OF ATMOSPHERICAL CARRIERS OF ELECTRICITY DURING PRECIPITATION

By K. Kähler

Gerlands Beiträge zur Geophysik, vol. 27, No. 2, 1930, pp. 226-240.

The number of atmospherical ions of all velocities, of small, intermedial, and large ions have been counted at the Potsdam observatory during rains, squalls, and thunderstorms. The results of these measurements are compared with synchronous registrations of the atmospheric potential gradient. The electrical process in rain clouds, especially the new Wilson-theory on the origin of the electrical charges of the drops, is discussed.--Author's abstract.

5. RADIOACTIVE METHODS

(24) LA TENEUR EN RADIUM DES EAUX PÉTROLIFIÈRES DE BAKOU ET DU DAGHESTAN

(RADIUM CONTENT OF PETROLIFEROUS WATERS IN THE REGIONS OF BAKU AND DAGHESTAN)

By B. Nikitin and L. Komleff

Comptes Rendus de l'Académie des Sciences, Paris,
vol. 191, No. 7, 1930, pp. 325-326.

The authors studied the petroliferous waters in the regions of Baku and Daghestan (Caucasus).

Seventy-two samples taken from the region of Baku were examined. The emanation method was used. Measurements were made with Schmidt's electrometer. The highest content of radium, averaging 3×10^{-11} Ra per cent (in weight), was found in the waters of the Bibi-Eibat group (Baku), the richest at a depth of about 600 meters.

Twenty-two Daghestan samples were studied. The average content of Ra was 1.2×10^{-10} per cent. These waters contained about 0.03 per cent of barium. There was no proportionality between the contents of barium and radium.

Several wells are very rich in waters, their output being about 640,000 liters per day. Thus, the quantity of radium brought by them to the surface of the earth reaches about 0.2 gram per year.--W. Ayvazoglou.

(25) THE RADIOACTIVITY OF STONE MOUNTAIN

By James A. Hootman and W. S. Nelms

The Physical Review, vol. 35, No. 11, 1930, pp. 1431-1432.

This is an abstract of a paper presented at the American Physical Society held in Washington, D. C., April 24-26, 1930. The abstract reads as follows:

"The radioactive content of the waters which issue from the base of the unique geological formation known as Stone Mountain (Georgia) was determined. Tests were made of a number of large springs well distributed around the base of the mountain, and of other shallower sources above and below the 1,060-foot level. The method employed was the Schmidt shaking method, in which a known volume of water is thoroughly shaken with a known volume of air in a closed container. The resulting mixture of air and radium emanation is then pumped into an electroscope, and the rate of fall of the leaf is a measure of the radioactivity of the water. The electroscopes were calibrated by means of the Duane and Laborde formula, and corrections were made for temperature and pressure. This method has been shown by Ramsey to have an accuracy of about 3 per cent. A majority of the springs tested were highly radioactive, the value for the highest being 15,980 x 10^{-12} curies per litre. This value is nearly twice the maximum reported by Boltwood for 44 radioactive springs, and more than half as large as the maximum reported by Lester for 178 mineral waters of Colorado."--W. Ayvazoglou.

(26) THE NATURE OF COSMIC RADIATION

By L. F. Curtiss

The Physical Review, vol. 35, No. 11, 1930, p. 1433.

This paper was among those included in the program of the meeting of the American Physical Society held in Washington, D. C., April 24-26, 1930. The abstract of this paper, as published in the Physical Review, reads as follows:

"The Geiger-Müller tube counters placed vertically above each other show, in addition to accidentals, coincidences which have been ascribed to cosmic rays. Absorption experiments by Bothe and Kohlhörster indicate that these rays are corpuscular. The author has made observations with the poles of a large electromagnet between two counters, recording the number of coincidences with and without the magnetic field. With the field used of 7,000 gauss over an area 24 centimeters in diameter, a parallel beam of 10^9 volt electrons which passes through the upper counter would be deflected sufficiently just to miss the lower counter in spite of the fact that the $H\rho$ for such electrons is approximately 3 x 10^0. Since the radiation is actually diffuse with a maximum in the vertical direction, using two counters one can expect only a slight decrease in the coincidences if they are caused by high-speed electrons. However, if they are due to ultra γ-rays, no such effect should be observable. Making the theoretical allowance for accidentals, a decrease of the order of 25 per cent has been observed in the coincidences which may be attributed to cosmic radiation. This confirms the existence of a corpuscular radiation of very high energy."--W. Ayvazoglou.

(27) UEBER DEN KLEINIONENGEHALT DER LUFT AUF HELGOLAND UND SEINE ABHÄNGIGKEIT VON METEOROLOGISCHEN FACTOREN

(ON THE CONTENT OF SMALL IONS IN THE AIR IN HELGOLAND AND ITS DEPENDENCE ON METEOROLOGICAL FACTORS)

By Oskar Mathias

Gerlands Beiträge zur Geophysik, vol. 27, No. 3-4, 1930, pp. 360-377.

Statistical investigations of the numbers of small ions obtained in Helgoland have revealed striking relations with meteorological and maritime factors, especially with those closely connected with the number of nuclei (direction of wind, transparency of atmosphere, sunshine.) The author recommends that in future in counting the ions the Aitken-nuclei be also counted at the time of observations as, according to investigations described in this article, they are of the greatest importance for the number of small ions. A direct influence of temperature could not be proved. Owing to small air-pressure changes during the time of observations (maximum 14 mm. Hg.), the investigation of its influence upon the number of ions was considered unnecessary and was not carried out. Interesting correlations with the degree of cloudiness and the tides were revealed. The increase in cloudiness caused an increase in the number of ions; this effect remained, of course, to be examined and explained. The average number of small ions was considerably greater at high tide than it was at low tide, a fact which seems to indicate a local formation of nuclei.

The relation of $\bar{n}_+ | \bar{n}_-$ showed a distinct correlation with the number of nuclei as well as with the relative humidity. This relation can be explained by the supposition that there exists a different capacity for accumulation of positive or negative small ions around the nuclei, respectively around the small water drops (formation of large ions). The relation $\bar{n}_+ | \bar{n}_-$ to the height of the waves is more complicated and requires further investigation.

The correction of the number of ions resulting from re-calibration of the anemometer does not meet the conclusions drawn by Hess concerning the balance of ionization. The relation between the number of ions and the average life of small ions shows a difference from the linear correlation for high values of $\bar{n}$; this can be completely explained by the deviation from the linear law of recombination.--Author's abstract translated by W. Ayvazoglou.

6. GEOTHERMAL METHODS

(28) THE STUDY OF EARTH TEMPERATURES IN OIL FIELDS ON ANTICLINAL STRUCTURE

By K. C. Heald

American Petroleum Institute, Bulletin 205, October, 1930, pp. 1-8

The purpose of the work described was, in general, to determine, if possible, the conditions responsible for variations in the rate at which temperature increases with depth, and for the changes that take place between one locality and another. More specifically it was proposed to determine, in so far as possible, relations between earth temperatures and the occurrence of oil and of helium-bearing gas in both local and regional geologic structure. It was further proposed to secure data on the relationships between earth temperatures and stratigraphic conditions, water circulations, and, in short, any geologic conditions that may be pertinent in connection with the discovery and the production of petroleum and natural gas.

The work has been centralized in areas where results will be most significant to the petroleum industry. Oklahoma, Texas, and California were chosen for study, since they not only offer favorable conditions, but also they are the areas where the results of the work seem best calculated to be of service to the industry. Work has been in progress in these three States since the spring of 1927 and the results obtained are briefly mentioned in this article.

Oklahoma. Local structure, chemical action, radioactivity, water circulation, effects of unconformities and effect of strong faulting are considered. Four maps are given.

Texas. Conditions of work, general accomplishment, stratigraphic conditions, relation of earth temperature to structure, regional metamorphism, and relation of rock temperature to oil fields are described.

California. Geologic conditions, plan of work, results, relation of temperature to circulating waters are examined.

Owing to the assistance given to the work described in this article by the U. S. Geological Survey and C. E. Van Orstrand, an outstanding American authority on earth temperatures and methods of measuring them, Heald considers the results obtained to be highly creditable.--W. Ayvazoglou.

(29) DESCRIPTION OF APPARATUS FOR THE MEASUREMENT OF TEMPERATURES IN DEEP WELLS; ALSO, SOME SUGGESTIONS IN REGARD TO THE OPERATION OF THE APPARATUS, AND METHODS OF REDUCTION AND VERIFICATION OF THE OBSERVATIONS.

By C. E. Van Orstrand

American Petroleum Institute, Bulletin 205, 1930, pp. 9-18.

In a brief introduction to the article Van Orstrand says that of the various methods that have been proposed for the measurement of temperature in deep wells, two only, the electrical resistance thermometer method and the mercury maximum thermometer method, have yielded results of sufficient importance from the standpoint of efficiency and accuracy to justify their use in making an extended temperature survey.

These two methods are described in this article.

The advantages of the electrical resistance thermometer method over the mercury maximum thermometer method are, according to the author, so great that it will undoubtedly come into general use as soon as the main obstacles--the initial expense of the necessary equipment and the difficulty of constructing leads that will remain intact after being immersed in a mixture of crude oil and salt water--are overcome.

The results of the tests carried out by this method are shown in a depth-temperature curve of deep well, E. T. Price No. 9, South Penn Oil Co. From this figure the minute details of the temperature distribution are evidenced. A brief description of the apparatus is given.

The mercury maximum thermometer method has the disadvantage of being slow and tedious. Its chief advantages are minimum initial expense and the certainty of obtaining an accuracy of rather less than 0.3° F., regardless of the fluid contents of the well. The two methods of handling maximum thermometers, (1) by means of the bailer and (2) by means of a handoperated machine, are described. Thermometer holder and containers, as well as other pieces of apparatus, and several views of hand-operated machine are given in a series of pictures.

The second part of the article deals with some suggestions in regard to the operation of the temperature apparatus: (a) Tests with the oil well machinery, and (b) tests with a hand-operated machine. The operation is explained and the elimination of the chief sources of error in handling the thermometers is mentioned.

The last chapter of the article deals with some suggestions in regard to the correction and verification of the observed temperature data. The possibility of accurate location of the isogeothermal surfaces owing to the difficulty of obtaining a correct answer whether the well is in temperature equilibrium or not is discussed.

In conclusion the author makes statements in regard to the accuracy with which the isogeothermal surfaces can be determined; he says: "That they are smooth uniform surfaces before the drill penetrates the pay sands can not be denied. The real problem, therefore, is the location of these surfaces in their undisturbed condition. Barring the perturbations produced by flowing fluids previously discussed, there remains the instrumental errors of observation."

The errors in depth to the isothermal surface resulting from instrumental errors are estimated.--W. Ayvazoglou.

(30) DETERMINATION OF GEOTHERMAL GRADIENTS IN OIL FIELDS LOCATED ON ANTICLINAL STRUCTURES IN OKLAHOMA

By John A. McCutchin

American Petroleum Institute, Bulletin 205,
October, 1930, pp. 19-61.

This report contains data which have been collected in the various fields and the conclusions which these data seem to warrant.

Curves from several wells are included and, where practical, are chosen from wells located near the centers of the fields and near the edges of the fields. The curves have been selected from wells which are considered to be in temperature equilibrium, and are the best available from these areas at the present time. It has not been deemed necessary to include curves from all wells tested; since many of them are very similar, and anyone who is further interested may plot the remaining curves from the data presented. The computed and tabulated data from 89 wells are also included.

While the data collected to date on this problem in Oklahoma are by no means sufficiently complete to permit other than preliminary conclusions to be drawn, as a whole, they do tend to support the general premise that the anticlines which have been productive of oil and gas have higher temperatures at given depths than the surrounding areas.

The variations within the individual fields are usually small, but measurable and uniform. The variations from area to area are quite large, and seem to bear a relation to the regional dip of the formations. This latter variation is so marked that all the data collected to date support it.

Due to the nature of the work, which involves the location and testing of the idle wells, most of the data have been collected near and within the fields proper, and very few tests have been made in dry holes located between the fields. This gives the problem a one-sided viewpoint, since it is impossibl to know that geothermal anticlines do not exist where no true geological anticlines are to be found.

An interesting possible explanation is suggested by examining the available data. The anticlines which have been the most productive of fluid, either oil or water, show the largest and most uniform variations in temperatures at given depths. It is possible, then, that the removal of large quantities of water and oil from the higher points in the structures has allowed the warmer fluid from the greater depths, either down the dips of the formations or within the formations, to rise in the sands and occupy the pore spaces of the cooler rocks. It seems possible, then, that the abnormally high temperatures which are present in the rocks over the anticlines now may be due to this circulation. It is to be noted that the data which were collected in the Oklahoma City field, before an appreciable amount of fluid had been removed from the field, failed to show a marked variation in temperature with structure.

On the other hand, the data from the few wells located in the nonproductive areas indicate that these wells have rather markedly lower temperatures at given depths as compared with the temperatures in wells located within the adjacent fields. In most instances, the data from the first 1,000 feet of the hole would have indicated an abnormally low temperature throughout the entire well.

Taken as a whole, the results obtained in Oklahoma to date on this project are neither consistent nor inconsistent enough to warrant any general conclusions as to the outcome of the project. The results do indicate that the problem is not a simple one, and that it will probably be solved by the collection of additional accurate data in the fields and dryhole areas, supplemented perhaps by some careful work on the heat conducting properties of sedimentary rocks in a well-equipped laboratory. Particular attention should be given to the collection of data from fields which are being developed, so that more information will be available from areas where there is no possibility that the operating conditions have influenced it.--Author's abstract.

(31) RESULTS OF DEEP WELL TEMPERATURE MEASUREMENTS IN TEXAS

By E. M. Hawtof

American Petroleum Institute, Bulletin 205,
October, 1930, pp. 62-108.

This paper presents a summary of the work of the writer carried out between the dates March, 1927, to January 1, 1929. During this period temperature measurements in deep wells were made in each of the oil yielding provinces of Texas, including the Gulf Coast salt dome province, the interior salt dome province of East Texas, the Luling-Mexia-Powell fault zone province, the Bend Arch, the Panhandle, the Permian Basin of West Texas and Southwest Texas.

A general picture of the geothermal conditions has been secured, which should not only justify certain preliminary conclusions, but should also permit effective planning and conduct of further and more detailed work in selected areas.

Equipment. The apparatus used in making temperature surveys was modeled after that described by Van Orstrand. Photographs of the apparatus are given.

Stem correction for maximum thermometer. All tests were corrected using the stem correction given by the U. S. Bureau of Standards. This correction may amount to as much as 1° F. in deep tests, although it is commonly much less.

Difficulty in securing suitable wells owing to their usually unsettled conditions is noticed.

Geological conditions dealt with. The wells in which temperatures were taken ranged in depth from less than 1,000 to more than 8,000 feet; thus a wide range of different structural types was covered by the work. Some idea of the regional structural conditions is given in a map of Texas showing by structure contours the writer's interpretation of the structural conditions, the location of wells that yielded results of particular interest, and the number of feet of depth which, in each of the wells indicated, resulted in an increase in temperature of 1° F.

A series of maps, cross sections, and depth-temperature curves illustrate the article.

Original field notes and temperature tests carried out during this work, showing the county, field, company, well, name and number, are given in an appendix.--W. Ayvazoglou.

(32) GEOTHERMAL CONDITIONS IN OIL PRODUCING AREAS OF CALIFORNIA

By Anders J. Carlson

American Petroleum Institute,
Bulletin 205, October, 1930, pp. 109-139.

This report is a summary of the work concentrated mainly in the Santa Fe Springs and Long Beach fields of the Los Angeles Basin. Therefore, the results are particularly significant only in respect to relations between earth temperatures and local anticlinal structure of the Santa Fe Springs and Long Beach types.

The apparatus used was patterned after that designed by Van Orstrand with some changes made to facilitate operation of the equipment. A depth of 5,000 feet has been reached. Under favorable conditions a 4,000-foot survey could be completed in one day.

The reliability of measurements with this type of apparatus was demonstrated by the re-survey of some wells after a lapse of several months. The comparative average temperatures obtained by the author and by Van Orstrand for one well are shown in a table. This check made with different sets of thermometers is so close as to show that satisfactory results can be obtained by this method.

All tests were corrected using the stem correction formulated by the U. S. Bureau of Standards.

Factors affecting measurements are discussed.

In the attempt to determine whether or not a relationship exists between earth temperatures and geologic structure, the author has compared both isogeothermal surfaces and the distribution of reciprocal gradients to geologic structure. He concluded that in general the work in California indicated that the isothermal depth was a more reliable medium of comparison than the reciprocal gradient. This is explained by the fact that shallow temperatures seem to be more seriously affected by artificial conditions than do deep temperatures, and this would tend to affect the gradient of a well to a greater degree than it would the depth of the 100° isotherm.

Geological conditions under which the measurements were made and the types of wells used are described. Temperature determinations in 33 wells in e Santa Fe Springs fields were made. The depth-temperature curves for these ells are shown in Figures 9 to 41. A table showing the geothermal data is iven.

Geothermal data for 43 wells in Long Beach Oil field are shown in a able.

Conclusions from the study of the data presented, for both the Santa e Springs and Long Beach oil fields, are drawn.--W. Ayvazoglou.

(33) SULLA PREVISIONE DELLA TEMPERATURA NELL'INTERNO DELLE MONTAGNE

(PREDICTION OF TEMPERATURE INSIDE OF MOUNTAINS)

By Mario Bossolasco

Ergänzungshefte fuer Angewandte Geophysik,
vol. 1, No. 2, 1930, pp. 149-155.

After a few remarks on the practical value of different methods for e prediction of the temperature of rocks inside of mountains, the author men- ions the importance of the position of the strata for the solution of these roblems and explains by this the high maximum temperature which was established n the Simplon Tunnel.

He shows that the normal course of the geoisotherms can not be ffected in a sensible way by hot springs. This is in contradiction to a con- irmation made previously.--Author's abstract translated by W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(34) MATHEMATICS AND THE PROBLEM OF ORE LOCATION

By Warren Weaver

The American Mathematical Monthly, vol. 37, No. 4, 1930, pp. 165-181.

The author divides his article into four parts:

A. Introduction. Some branches of earth physics by which the subsurface xploration is possible are considered.

B. The methods of geophysical exploration for ore and oil (magnetic ethod, electrical method, electromagnetic method, gravitational method, and he seismic method) are briefly discussed and illustrated by six figures.

C. The mathematical problems, as connected with the geophysical methods f prospecting are examined. Weaver notes the difference of the problems of eophysics from many classical problems which he characterizes as follows: irst of all, they are two or three-dimensional problems; second, there are lways three important regions of space involved, each with its own characteristic electrical properties--the air, the normal homogeneous earth, and the ore masses; third, it is necessary to have exact knowledge near the sources of disturbance, rather than far away, as in the classical problem of radio signals; fourth, it is useful, in the electromagnetic case, to obtain solutions when the wave length is comparable with the dimensions of the diffracting ore mass, rather than small, as in the classical optical case; fifth, it is necessary, in general, to assign finite but different conductivities to the various regions under consideration; sixth, many regions of geometrical shapes, which were previously of only academic interest, now become of great practical interest; and, last, it is essential now that the solutions be usable from a computative point of view.

D. Conclusions. The first application of divining rods to the location of ore, as described in an old treatise of mining written by Georgius Agricola and published in 1556 (translated from the Latin by Herbert Hoover), is mentioned and the complicated equipment of the geophysicist of to-day with his dip needle, his voltmeter, radio apparatus, slide-rule and his textbook on partial differential equations is noted.--W. Ayvazoglou.

(35) GEOPHYSICS AND DEEP DRILLING SHAPE DESTINY OF GULF COAST

By Jack Logan

The Oil Weekly, vol. 59, No. 3, 1930, pp. 63-66.

The results of geophysical exploration and deeper drilling in the Gulf Coast field are summed up. According to information given by Logan, instead of approximately 40 domes and fields as in 1923, the Gulf Coast now has more than twice that number. The potentialities of the coastal area have besides not merely been doubled by the 100 per cent increase in the number of domes and fields, but they have been multiplied perhaps several times by accessibility in both old and new fields of deep sands which formerly could not be reached with the drill.

The immense increase in potentialities of the Gulf Coast as a source of oil is due to two principal factors: Deep drilling and geophysical exploration.

In this article the author discusses in more detail geophysical exploration as a factor by which the potentialities of the salt-dome oil country have been greatly widened.

Tables listing all old domes and geophysically discovered fields and prospects and a special map showing those numerous areas are given. The tables and the map reveal the brilliant record achieved by geophysics and the geophysicists.--W. Ayvazoglou.

(36) RECHERCHES SUR LES PERTURBATIONS ÉLECTROMAGNETIQUES, SISMIQUES ET SOLAIRES

(INVESTIGATIONS ON ELECTROMAGNETIC, SEISMIC AND SOLAR DISTURBANCES)

By Allert Nodon

Comptes Rendus de l'Academie des Sciences, Paris,
vol. 188, No. 10, 1929, pp. 725-726.

Investigations were made during almost two years by Boustos Navarette, Director of the Observatory del Salto in Santiago (Chile). Nodon's magnetograph was used.

Graphs obtained from observations made by magnetograph, seismograph, and galvanometer, as well as those made on the variations of sun spots proved the existence of a close relation between all of them.

From the results of these observations the important conclusion can be drawn that earthquakes can be predicted from the indications of the magnetograph several hours in advance.--W. Ayvazoglou.

(37) A BRIEF REVIEW OF ARTICLES APPEARING IN VOL. 2, NOS. 1, 2, AND 3 OF THE "BOLETIN DE LA ASOCIACION GEOFISICA DE MEXICO"

Boletin de la Asociacion Geofisica de Mexico,
vol. 2, Nos. 1, 2 and 3, 1930, pp. 1-78.

1. The physical principles of the gravitational method of prospecting, by B. P. Nikiforov. Continuation of the translation into English, pp. 15-22; into Spanish, pp. 39-45 and 61-66. Both parts translated by Prof. J. Korzujin.

2. Mathematical principles for topographic correction in gravimetrical work. By V. A. Olhovich. The article is to be continued.

3. Review of Geophysical Prospecting for Petroleum, 1929. This is Donald C. Barton's article published in the Bulletin of the American Association of Petroleum Geologists, vol. 14, No. 9, 1930, pp. 1105-1129 (see Geophys. Abs. No. 18), translated into Spanish by Manuel Alvarez.

4. Geophysical Methods of Prospecting, by Georges A. Boutry. Continuation of the French article translated into Spanish by L. Urguijo, Eng. (see Geophys. Abs. No. 8).--W. Ayvazoglou.

(38) SCHALLGESCHWINDIGKEIT UND TEMPERATUR IN DER STRATOSPHÄRE

(VELOCITY OF SOUND AND THE TEMPERATURE IN THE STRATOSPHERE)

By B. Gutenberg

Gerlands Beiträge zur Geophysik,
vol. 27, No. 2, 1930, pp. 217-225.

The registrations of air waves confirm consequences drawn previously from ear observations. The results gained from the graphs show that the height in which velocity of sound and temperature begin to increase is not the same in all cases. Sometimes, especially in winter and in spring, it is as low as 20 kilometers. A simple method of calculation to find the sound velocity in the stratosphere is given.--Author's abstract.

8. GEOLOGY

(39) DIE RANDWERTAUFGABE DER GEODÄSIE

(THE BOUNDARY-VALUE PROBLEM OF GEODESY)

By F. Hopfner

Gerlands Beitrage zur Geophysik, vol. 27, No. 3-4, 1930, pp. 312-325.

The problem of determining the level extending into the sea-level (as it is known below continents it extends inside of the earth crust) by observed and properly reduced values of gravity comes under boundary-value problems of the second kind among which it holds the place between the exterior and interior space problems. In this article the author gives the solution of this problem with the aid of special functions of Green. The boundary-value problem of the first kind is solved also.--Author's abstract.

9. NEW BOOKS

(40) Krahmann, Rudolf. Die Anwendbarkeit der geophysikalischen Lagerstättenuntersuchungsverfahren, insbesondere der elektrischen und magnetischen Methoden (The Applicability of geophysical methods for prospecting deposits, especially of the electrical and magnetic methods). With 37 figures. Price, R.M. 2.50. This is the 3d volume of the "Abhandlungen zur praktischen Geologie und Bergwirtschaftslehre" issued by Prof. Dr. Georg Berg (Berlin, Geologische Landesanstalt).

(41) Stoner, Edmund C. Magnetism. E. P. Dutton and Co., New York, 1929. pp. vii, 117, 20 figs., Price, $1.10. The topics treated are: The magnetic properties of atoms; diamagnetism as a general property of all matter; paramagnetism; ferromagnetism; the magnetic properties of the elements and the change of electrical conductivity in strong magnetic field.

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GEOPHYSICAL ABSTRACTS[1]

No. 22

Compiled by Frederick W. Lee[2]

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[2] - Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(42) A REDETERMINATION OF THE CONSTANT OF GRAVITATION

By Paul R. Heyl

Bureau of Standards Journal of Research, vol. 5, No. 6, 1930, pp. 1243-1291.

Contents of the article:

I. Introduction: 1. The nature of the constant of gravitation; 2. Summary of earlier measurements; 3. Work of Boys; 4. Work of Braun; 5. Organization of the present work.

II. Plan and method.

III. Description of apparatus: 1. Observation room; 2. The large masses; 3. The supporting system; 4. The small masses; 5. The moving system; 6. The container; 7. The optical system; 8. Measurements of time; 9. Measurements of length.

IV. Mathematical theory: 1. The attraction of a finite cylinder at any external point; 2. Formula for time of swing.

V. Method of observing: 1. Centering adjustments; 2. Length measurements: a. horizontal; b. vertical; 3. Time measurements.

VI. Computations.

VII. Results: 1. Gold balls; 2. Platinum balls; 3. Glass balls; 4. Mean value; 5. Discussion of results.

VIII. The specific attraction of platinum and glass.

IX. Summary and general conclusions.

Author's abstract reads as follows: "A redetermination of the constand of gravitation has been made, using the torsion balance in vacuum. The large masses were steel cylinders weighing about 66 kilograms, and the small masses spheres of gold, platinum, and optical glass. The final result obtained is 6.670 x 10^{-8} cm^{3} g^{-1} sec.$^{-2}$.

"While the results obtained appeared to differ slightly with small balls of gold, platinum, or glass, it was shown by a special experiment with the form of torsion balance used by Eötvös that this is not to be attributed to difference in material."

Fourteen figures and 20 tables illustrate the article.--W. Ayvazoglou

(43) GRAVIMETRICAL OBSERVATIONS OF THE BEREKEY OIL REGION DURING THE YEARS 1927 AND 1928 (IN RUSSIAN)

By S. P. Poletajev

Neftianoe Khoziaystvo, vol. 19, No. 10, 1930, pp. 385-392.

The problem of the gravimetrical survey of the Berekey oil region consisted of investigating the anticline fold and establishing the structure of the dome of the foraminiferous layers at the top of which a petroleum horizon was known. This question could not be solved satisfactorily by geologists, owing to the absence of outcrops and insufficient correctness in old geological maps.

The data obtained by gravimetrical survey did not agree with the old representation of the geological structure of the region of Berekey and the direction of the axis of the anticline was found to be different from that expected by geologists. The results of the gravimetrical survey are given in two maps, a series of crosscuts and schemes showing the structure of the Berekey dome as based on the data obtained during 1927 and 1928.

The following conclusions were drawn:

1. It was proved by the gravimetrical work that the geological structure of the region of Berekey was more complicated than could be expected on the basis of the data obtained from drilling.

2. There is a break of foraminiferous layers along the anticline axis not only in the territory of the Berekey petroleum field but also to the north of it.

3. The foraminiferous layers in the region of the oil fields are not distributed in accord with chalk and probably are separated from it by less solid masses (clays).

4. In order to explain the inconstancy in the difference of the mean densities of masses situated above and below the top of the foraminiferous layers, it must be assumed that the foraminiferous layers in the region of Berekey are divided into thin scales.--W. Ayvazoglou.

(44) ELEMENTS OF ISOSTASY -- OBSERVATIONS AND INTERPRETATION

By William Bowie

Scientific Monthly, August, 1930, pp. 163-176.

Taking into consideration the importance of isostasy as a branch of geophysical science, Bowie describes in this article its elements, observations, and interpretation under the following headings: 1. Measuring of isostasy; 2. Isostasy in India (J. Pratt and G. Airy); 3. Deflections from the vertical and their causes; 4. Isostasy in the United States; 5. Maintenance of isostatic equilibrium; 6. The earth a yielding mass; 7. Study of gravity anomalies by grouping stations; 8. Explanation of gravity anomaly;

9. Studies of isostasy in Canada; 10. Determination of depth of compensation; 11. Horizontal extent of compensation; 12. denudation and sedimentation; 13. Mountain formation; 14. Relation of gravity anomalies to geological structure.

The author concludes that much more could be said in regard to the importance of keeping isostasy constantly in mind when one tries to solve the great structural and dynamic problems of geology; and that undoubtedly the literature of the future will treat isostasy at even greater length than has been the case in the past.--W. Ayvazoglou.

(45) ISOSTATIC COMPENSATION IN RELATION TO GEOLOGICAL PROBLEMS

By George R. Putnam

The Journal of Geology, vol. 38, No. 7, 1930, pp. 590-600.

The bearing of gravity results on general geological problems is made more clear by recognizing the fact that complete local isostasy is impossible, and that such an assumption leads to appreciable errors in gravity anomalies in mountainous regions. The horizontal and vertical distributions of isostatic compensation are interrelated, and should be studied together. The ranges of assumptions as to both are stated, with the probable limits. The truth of regional instead of local isostasy has important bearings on geological deductions, and makes the gravity results more consistent with other geological evidence as to the earth's crust.--Author's abstract.

2. MAGNETIC METHODS

(46) DIE MAGNETISCHEN EIGENSCHAFTEN DER ERUPTIVGESTEINE

(MAGNETIC PROPERTIES OF ERUPTIVE ROCKS)

By Kurt Puzicha

Zeitschrift fuer praktische Geologie, vol. 38, No. 11, 1930, pp. 161-172, and No. 12, 1930, pp. 184-189.

Contents of the article:

1. Introduction.

2. Critical consideration of methods used so far, as well as of the result

3. Stating of the problem.

4. Arrangement of the experiments: (a) theory; (b) constructive data; (c) adjustment.

5. The results: (a) general; tabular classification of the results of measurements; (b) the dependence of the susceptibility on the field strength; (c) the dependence of the susceptibility on the mineral components of the rocks; (d) the dependence of the coercive force and of the remanence on the mineral components of the rocks.

The author's summary of the article reads as follows:

With the aid of a sensitive ballistic measurement process the general magnetic properties of eruptive rocks were examined on a large number of samples.

It was established that:

1. The susceptibility was independent of the field strength only in a small part of the rocks examined.

2. The susceptibility decreased with the increase of the field strength only in exceptional cases; in most cases it increased with the increase of the field strength. This increase reached about 230 Gauss, almost 180 per cent (65 per cent on the average).

3. The character of the susceptibility depended mainly on the content of magnetite; the increase was proportionally smaller in magnetic pyrites. A conclusion on the amount of susceptibility could not be drawn from the quantitative determination of the content of magnetite only; the size of grains was to be taken into consideration also.

4. The grade of magnetizability did not depend on the content of titanium in the magnetite; ilmenite did not prove to be magnetizable.

5. The coercive force amounted to several hundred Gauss. It depended mainly on the content of iron oxides, magnetic pyrites, and titanium-free magnetite. Titanium magnetite possessed high susceptibility but only limited coercive force.--Author's abstract translated by W. Ayvazoglou.

(47) TERRESTRIAL MAGNETISM FROM THE VIEWPOINT OF THE ENGINEER

By N. H. Heck

Scientific Monthly, April, 1930, pp. 326-341.

A description of instruments and proceedings for obtaining data on magnetic surveying, illustrated by photographs and diagrams, is given.

The difficulties of studying all the different phenomena associated with terrestrial magnetism, as well as the difficulty of completely understanding them and predicting future conditions with accuracy, are mentioned.

The author predicts, that just as in many other fields of physics the investigations started for a definite purpose have produced wholly unanticipated results, the engineers interested in terrestrial magnetism, although not accustomed to undertake problems for which the complete solution is far ahead, as engineering research is established on the basis of immediate or early financial return, will finally also have to engage in research which has no immediate prospect of financial return.--W. Ayvazoglou.

(48) SUR LE LEVÉ MAGNÉTIQUE DES KARPATES DE SKOLE ET DE LEUR AVANT-PAYS

(ON THE MAGNETIC SURVEY IN THE SKOLE-CARPATHIANS AND THEIR FORELAND)

(IN POLISH)

By E. Stenz and H. Orkisz

Compte Rendu du 1-er Congrès de la géologie du pétrole à Lwow,
14-15 December, 1929, pp. 97-103.

Two magnetic surveys were carried out in the Skole-Carpathians during 1929: one absolute and one relative. The absolute survey has been carried out on an area of about 4,050 square kilometers within the limits of the 1 : 75,000 maps of Drohobvcz, Skole, Bolechów and Zydaczów.

Two dip-needles manufactured by Chasselon in Paris and one magnetic theodolite (small model) were used for the measurements. The distance between the points of magnetic inclination was 4 kilometers, that between the points of the horizontal component 6 kilometers, and between the points of declination 6 kilometers.

In general there were made: 248 measurements of inclination, 65 measurements of the horizontal component, and 35 measurements of declination. All the results were reduced to the same epoch: 1928.5.

The relative survey has been carried out for the purpose of prospection. It consisted of 990 points of measurements of the vertical component carried out within the limits of the polygon Stryj-Stebnik-Synowódzko-Bolechów-Zurawno-Zydaczow-Stryj. The density of the points was equal to 1 kilometer. Schmidt's magnetic vertical balances were used for the observations.

Records obtained with the Askania-Werke magnetograph, installed in Daszawa, near Stryj, were used for the reduction of the results of measurements.

Maps showing (1) the horizontal component of the magnetic field, (2) the inclination, and (3) the anomalies of the inclination are added to the article.

The magnetic survey shows an interesting agreement between the course of the isodynamics and the direction of the Carpathian "skibas" (blocks driven one upon the other in the direction, in this region, from southwest to northeast).--Author's abstract translated by W. Ayvazoglou.

(49) RÈGLES PRATIQUES POUR L'EMPLOI DU MAGNÉTOMÈTRE DANS LES PROSPECTIONS GÉOPHYSIQUES

(PRACTICAL RULES FOR THE USE OF THE MAGNETOMETER IN GEOPHYSICAL PROSPECTING)

By M. C. Alexanian

Annales de l'office national des combustibles liquides,
vol. 5, No. 4, 1930, pp. 677-702.

Contents of the article:

Introduction.

Sources of error arising from: (1) construction; (2) observation; (3) natural causes.

I. Errors arising from construction: (1) Errors in construction; (2) displacement of the center of gravity of the magnetic system; (3) displacement of the zero point of the scale; (4) determination of the constants. Scale-constants (vertical component, horizontal component); (5) temperature constants; (6) variation of the horizontality of the apparatus; (7) conditions of the knife-edges.

II. Errors arising from observation: (1) Choice of stations; (2) setting up of the instrument; (3) position of the operator; (4) carrying out of measurements; (5) reading of the scale; (6) determination of the east-west magnetic direction. Influence of the bad orientation of the instrument; (7) final calculations.

III. Errors due to natural causes: (1) Displacement of geographic coordinates; (2) daily variations; (3) magnetic storms; (4) electric currents.

IV. Criticism of the results of measurements: (1) Accuracy of measurements; (2) agreement between the points of measurement; (3) magnetic profiles; (4) verification profiles; magnetic maps; (5) representation of numerical operations; (6) number of stations which can be completed during one day.

The different sources of error which may enter into the course of operations during a magnetic survey, as enumerated in the contents above, are discussed.--W. Ayvazoglou.

3. SEISMIC METHODS

(50) EARTHQUAKES, A CHALLENGE TO SCIENCE

By N. H. Heck

Scientific Monthly, August, 1930, pp. 113-126.

After a brief description of a few different types of earthquakes, which may serve for the purpose of illustration, the author discusses the challenges to science presented by them, the first of them being the cause of earthquakes. Concerning the relation of volcanoes to earthquakes, the author says that the volcano seemingly is a localized and rather superficial phenomenon as compared to the earthquakes, that generally earthquakes are due to the slipping of two rock surfaces on one another, and that it is peculiarly helpful to study the effect at the surface. Some examples supporting this supposition are given.

The necessity for accurate determination of the positions and elevations of fixed points in order to study the surface effects caused by earthquakes is mentioned.

The method of attacking the problem of studying the point of origin of an earthquake by measuring the time of travel of waves produced by large explosions, since in this case the point of origin is known, has resulted in the development and confirmation of the important earthquake wave theory. Principal earthquake waves are discussed and their paths shown in figures. The theory of isostasy is mentioned and illustrated by a figure. Two maps, one showing the places of known earthquakes of the United States and another the distribution of seismological stations of the United States and adjacent Canada are added.

The last part of the article deals with instruments for recording earthquakes. Photographs of the Wood-Anderson torsion seismometer and the Wenner seismometer, as well as the record produced by the latter, are given.--W. Ayvazoglou.

(51) ON THE RELATION BETWEEN THE SUNSPOT NUMBER AND THE DESTRUCTIVE EARTHQUAKES IN JAPAN (IN JAPANESE)

By Takeo Takayama and Takeo Suzuki

Bulletin of the earthquake research institute, Tokyo Imperial University, vol. 8, No. 3, 1930, pp. 364-374.

The present investigation is a statistical study on the relation between sunspot activity and the destructive earthquakes in Japan (Formosa excluded) for 318 years from 1608 to 1925. (Time and space distribution of destructive earthquakes is shown in a figure.) The method of this investigation is that the number of destructive earthquakes which occurred for three years containing the year of sunspot maximum or minimum and compared to the same in the other years, have been counted and reduced to the frequency in an equal duration, which at least were represented by the percentage frequency. Similarly the earthquakes percentage for five years of sunspot maximum or minimum was calculated.

The values of percentage given in four tables in the text are the mean values of these two cases. The authors took statistics dividing the whole time interval into two or four and also the space into three zones, i.e., Omori's inner (Japan Sea side) and external (Pacific side) seismic zones and the inland zone of earthquakes which is the aggregate of several local seismic zones between the above two. The result obtained is summarized as follows:

1. The authors could not find any noteworthy relation from the statisti- al data taken over the whole Japanese area (Table 1).

2. When, however, the three seismic zones are considered separately, there xist noteworthy relations, that is: (1) In the inner seismic zone the earth- uakes occurs more frequently in the vicinity of the sunspot maximum; (2) in he external seismic zone, on the contrary, the earthquakes occurs more fre- uently in the vicinity of the sunspot minimum; and (3) in the inland or iddle seismic zone the relation is not noteworthy (the relations are shown in igures). These facts suggest some possible relation in connection with the hift of the zone of the atmospheric high pressure.

3. On the cyclicity of the destructive earthquakes in Japan for from 660 o 1925, the curves of fluctuation of the seismic frequency have been constructed y taking various time intervals as unit of time in which the frequency is ounted.

. Each curve showed the apparent cyclic nature with its own period, hich is found to be three or four times as long as the assumed unit interval s shown in a table. This clearly shows that the apparent periodicity is not he real one but is subjected to the accidental phenomena completely investigated y Prof. T. Terada.--Author's abstract.

(52) RESULTS OF ELASTIC-WAVE SURVEYS IN CALIFORNIA AND ELSEWHERE

By Frank Rieber

Bulletin of the American Association of Petroleum Geologists,
vol. 14, No. 12, 1930, pp. 1557-1571.

The author's abstract reads as follows:

"Geophysical exploration in loosely consolidated materials presents a problem different from similar surveys in areas where there is a marked differentiation between beds. However, even in these loosely consolidated materials, velocity of wave transmission varies in general with depth of original overburden, and correlations based on this fact have been found reliable. Apparatus has been specially developed to meet the requirements of operation in such materials."

The question is discussed under the following headings:

1. Relation of lithology to velocity characteristics;
2. Relation of velocity to depth of original overburden;
3. Accuracy requirements in mapping loosely consolidated sediments;
4. Special features of interpretation of results;
5. Requirements for apparatus for mapping loosely consolidated materials.

Sixteen figures illustrate the article.--V. Ayvazoglou.

(53) THE SCREENING OF SOUTHEND FROM GUNFIRE

Editorial note

Engineering, vol. 130, No. 3387, 1930, pp. 731-732.

The mechanism by which velocity and temperature gradients cause the refraction of sound is discussed. The basis of refraction is, briefly, that the speed of sound propagation is increased by use of air temperature and increase of wind speed. If a sound wave-front be imagined to impinge obliquely on a stratum of air in which the temperature rises with altitude, the upper part of the wave, which penetrates first into the higher-temperature region, travels faster then the lower part, and the inclination of that portion of the wave to the horizontal is increased. If the instantaneous direction of propagation is normal to the wave-front, the sound is gradually refracted toward the earth. Similarly, if the wind component in the direction of the sound increases with height, the waves are refracted downwards. Conversely, if the wind and temperature gradients be such as to reduce the speed of sound as altitude increases, the wave-front is refracted upwards. These effects are illustrated by diagrams. A formula for the height of the acoustical shadow for a certain distance from the source of sound is derived.

An example of the application of the existing approximate methods concerning acoustic investigations are given by Dr. W. S. Tucker in connection with the screening of the north side of the Thames Estuary from the noise of 16-inch gunfire practice in the Isle of Grain.

Experiments with seismographs showed that no appreciable disturbance was transmitted through the ground. Therefore investigations of the "onde de choc" (sound due to the compression wave at the nose of a high-velocity projectile) were carried out. For the prediction of suitable firing conditions photographic records of gun reports were taken by sound ranging apparatus at three stations along the Southend front. The records are reproduced in figures

In order to facilitate the forecasting of safe firing conditions, Tucker devised a series of celluloid disks, shaped like the shadow diagrams shown in three figures. To ascertain meteorological conditions, the approximate wind gradient disk is placed on a map of the district, with its center at the gun, and oriented to the wind direction prevailing at the time. The approximate temperature gradient disk is superimposed, and the height of the resultant shadow at the range (5 miles) for which the disks are designed may be read off to scale.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(54) ELECTRICAL PROSPECTING

By Allen A. Rogers

The Tech Engineering News, vol. 11, No. 6, 1930, pp. 218-219 and 243.

After a brief mention of geophysics as an agency of prospecting for minerals and oil, the author describes the application of electricity for

ophysical prospecting. The method of equipotential lines and that of induc-
on are discussed. A map of current and equipotential lines and a plan and
ofile views of an ore deposit located by electrical prospecting are given.
conclusion Rogers points out that geophysical prospecting, being a new tool
r the geologist and mining engineer, can be used only by those trained in this
t. As an aid to extending the scope of the results of geological studies, to
nding and tracing certain concealed features of the earth's crust, it is in-
luable and its use is bound to increase.--W. Ayvazoglou.

(55) MESSUNG DER ELEKTRISCHEN ERDBODENEIGENSCHAFTEN ZWISCHEN 20 UND 2.10^7 HERTZ. (CYCLES PER SECOND)

(MEASUREMENT OF ELECTRICAL PROPERTIES OF THE SOIL BETWEEN 20 AND 2.10^7 HERTZ)

By M. J. O. Strutt

Elektrische Nachrichten-Technik, vol. 7, No. 10, 1930, pp. 1-8.

Contents of the article:

1. Importance of the electrical properties of the soil.
2. Measurements between 20 and 6.10^5 Hertz.
3. Arrangements for measurements between 6.10^5 and 2.10^7 Hertz.
4. Calibration of the tubular voltmeter in case of short waves.
5. Results of measurements in case of short waves.
6. Discussion of the results.
7. Summary.

The author measured the electrical conductivity between 20 and 5.10^5
ertz, as well as the electrical conductivity and the dielectric constant be-
ween 6.10^5 and 2.10^7 Hertz (undamped) in a moderately moist meadow ground.
he following results were obtained:

1. The conductivity increased between 20 and 500 Hertz to about 30 per
ent (polarization) and then remained practically constant up to 2.10^7 Hertz.

2. This frequency course remained approximately valid also in case of a
light change of the water content in the soil.

3. Contrary to the author's expectation, after a rain the damping influ-
nce of the soil upon the electrical wire waves decreased for waves below 200
eters.

4. The dielectric constant increased, owing to the rain, relatively more
han the conductivity -- this explained the conditions mentioned in No. 3.

5. The dielectric constants were about 10 and 15 (on the same ground after rain). Between 10^6 and 2.10^7 Hertz they depended on frequency to a slight degree only.--Author's abstract translated by W. Ayvazoglou.

(56) ELECTRICAL PROSPECTING IN THE REGION OF GROZNY (IN RUSSIAN)

By D. Golubiatnikov

Azerbeidjanskoe Neftianoe Khoziaystvo, vol. 10, No. 10, 1930, pp. 51-54.

The author describes the application of Schlumberger's method for investigation of rocks along the drilled holes ("electrical logs") in the region of Grozny. Field work carried out by Schlumberger's method of electrical prospecting is discussed. The methods are briefly described. The results are summed up as follows:

Investigation of rocks along the drilled holes by the method of electrical logs (carrotage) proved to be very satisfactory; several oil-bearing and water-bearing horizons not mentioned in the geological structural maps were established. Schlumberger's method of electrical prospecting in places covered with alluvium where good results can not be secured by digging is the sole means by which a quick answer on the conditions of the structure of the subsoil can be obtained.--W. Ayvazoglou.

(57) ELECTRICAL PROSPECTING IN THE REGION OF GROZNY (IN RUSSIAN)

By D. Golubiatnikov

Za Neftianuiu Piatiletku (for the 5-year oil industry program),
No. 11-12, 1930, pp. 11-14.

The author describes the electrical prospecting work carried out according to Schlumberger's method in the region of Grozny. Six parties were intrusted with the examination of rocks along the holes, investigation of sections of the holes, establishment of oil-bearing and water-bearing horizons, determination of the structural details of the Novo-Grozny and Staro-Grozny regions, search for new structures in the area adjoining the industrial regions and finally with the establishment of the possibility of finding the raising of the anticline toward the great plain to the north of the industrial region. All these geological tasks were solved by electrical prospecting very successfully.--W. Ayvazoglou.

5. RADIOACTIVE METHODS

(58) KENNELLY-HEAVISIDE LAYER HEIGHT OBSERVATIONS FOR 4,045 AND 8,650 KC.

By T. R. Gilliland

Bureau of Standards Journal of Research, vol. 5, No. 5, 1930, pp. 1057-1068.

Virtual heights of the Kennelly-Heaviside layer as measured by the radio-echo method are reported for 4,045 and 8,650 kc. The report covers daytime observations made each week between January 16 and June 19, 1930. Two ening tests are also described. Curves are given comparing heights with nspot numbers and magnetic character. Records taken on April 28, 1930, the y of the solar eclipse, are shown.--Author's abstract.

(59) RADIOACTIVE PROPERTIES OF ROCKS, SOILS, CRUDE OIL AND WATERS FROM SOUTHERN CALIFORNIA

By J. Lloyd Bohn

Journal of the Franklin Institute, vol. 210, No. 4, 1930, pp. 461-472.

This paper includes measurements on waters from Lake Arrowhead, rrowhead Hot Springs, Harlem Hot Springs, the Pacific Ocean, and from numer- s wells and tunnels of the Pasadena and neighboring water supplies. It also ncludes measurements on rocks, soils, and crude oil.

The activity of the water of Lake Arrowhead is found to be one hun- red times smaller than the minimum that could be detected with the electro- copes used for cosmic ray measurements by Millikan and Cameron. This lake s, therefore, very suitable for cosmic ray measurements. The Pasadena wells ield waters approximately one thousand times as active as the Lake Arrowhead ater, thus making the Pasadena reservoirs unsuitable for these measurements.

The ratio between the activity of the soil at Lake Arrowhead and hat of the soil from the Institute campus, as obtained by Millikan and Cameron rom their cosmic ray data, is in good agreement with the results in this re- ort. However, in this report no account is taken of the γ-radiation due to he thorium series, which is of the order of, and probably slightly exceeding, hat due to the radium series. If the Th|Ra ratio is constant, as is usually he case, then the results of the two methods are in good agreement.

The average radium content of the acid intrusive rocks in the vicin- ty of Devil's Gate Dam, Pasadena, is found to be 2.3 x 10^{-12} grams of radium er gram of rock.

Pasadena tap water contains about 1 eman or 1 x 10^{-10} curies per iter, while the average of the sources is about five times as great. The adium emanation found in crude oil was of the same order of magnitude as that ound in well water.

Carnotite when fused with carbonates at about 1,000° C. loses part f its Ra — probably as a sublimate of $RaBr_2$.

Such a loss in fusing rocks might account for the discrepancy be- ween the solution and fusion methods as found by J. Joly.--Author's abstract.

(60) UNTERSUCHUNG UEBER DIE BEZIEHUNG DER HÖHENSTRAHLUNG ZU ERDMAGNETISCHEN STÖRUNGEN

(INVESTIGATION ON THE RELATION OF PENETRATING RADIATION TO EARTH-MAGNETIC DISTURBANCES)

By Walter M. H. Schulze

Physikalische Zeitschrift, vol. 31, No. 22, 1930, pp. 1022-1025.

As long as the penetrating radiation was considered to be a very hard γ-radiation no relation between the intensity of radiation and the earth-magnetic phenomena was expected theoretically; therefore no experimental investigation has been made in this line. This question became of practical interest after the results obtained by investigations carried out by Bothe and Kohlhörster with Geiger's electron counter, according to which there were found, in additionto γ-rays, also rays of very high penetration, that is very rapid corpuscular rays, probably of the type of β-rays.

In this article the author gives the results of his studies, togethe with those of Corlin, concerning the exact calculation of correlation between the intensity of penetrating radiation and single earth-magnetic elements.

At the disposal of the author was a series of penetrating radiation-intensity measurements carried out by Corlin, as well as observations on the most important meteorological, magnetic, and aurora borealis phenomena in Abisco made from October 16, 1929, to January 12, 1930.

The measurements were made with Büttner's radiation apparatus A of Kohlhörster's type III. The results of the measurements are given in a series of tables.

A noticeable influence of magnetic declination disturbances could not be established on the basis of the investigations made. The question of the effect of the changes of the horizontal and vertical intensity upon ionization will be taken up for study.

In conclusion the author mentions briefly the relations to aurora borealis as established by investigations made by him.--W. Ayvazoglou.

(61) SCATTERING OF HARD γ-RAYS

By C. Y. Chao

The Physical Review, vol. 36, No. 10, 1930, pp. 1519-1523.

In a previous study of the absorption coefficient of hard γ-rays in various elements (Chao, Proc. Nat. Acad. Sci., vol. 16, 1930, p. 431) the author has found that the absorption coefficient of light elements was predicted fairly well by the Klein-Nishina formula, which assumes that the removal of the energy from the primary beam is entirely due to Compton scattering of the extranuclear electrons. For heavy elements, however, the experimental value was much larger than was to be expected from the Klein-Nishina formula or any other. Two causes can be suggested to explain this additional absorption: (a) it may be an extranuclear phenomenon due either to an ordinary photoelectric absorption or a breakdown of the Klein-Nishina formula for Compton scattering in these elements; (b) it may also be a nuclear phenomenon, such as the scattering by particles inside the nucleus or any other nuclear absorption (like the excitation of the photoelectric effect occurring there). In an attempt to obtain more information about these questions, a study of the scattered rays has been made.

The results obtained from this study are summed up by the author as follows:

Measurements have been made on the scattering of γ-rays from Th C by Al and Pb. For Al the scattering is, within experimental error, that predicted by the Klein-Nishina formula. For Pb additional scattered rays were observed. The wave-length and space distribution of these are inconsistent with an extranuclear scatterer, and hence they must have their origin in the nuclei.--Author's abstract.

(62) ON THE QUESTION OF THE CONSTANCY OF THE COSMIC RADIATION AND THE RELATION OF THESE RAYS TO METEOROLOGY

By Robert A. Millikan

The Physical Review, vol. 36, No. 11, 1930, pp. 1595-1603.

Mean cosmic-ray intensities have been measured with much precision both at Pasadena, Calif. (latitude 34), and at Churchill, Manitoba (latitude 59), the latter a distance of 730 miles from the North magnetic pole.

1. The observed equality in these intensities indicates that these rays enter the earth's atmosphere as photons rather than as streams of electrons.

2. Evidence is presented that the incoming rays are of a uniform intensity in all directions and in all latitudes, the small and apparently erratic fluctuations found by many observers at different stations arising simply from eruptions, waves, or ripples which change the thickness of the atmospheric blanket interposed between the source and the observer.

3. The cosmic-ray electroscope thus acquires significance as a meterological instrument.

4. The influence of these rays in the maintenance of the earth's charge is considered.--Author's abstract.

(63) THE SIGNIFICANCE OF RECENT COSMIC-RAY EXPERIMENTS

By R. A. Millikan and I. S. Bowen

Proceedings of the National Academy of Sciences,
vol. 16, No. 6, 1930, pp. 421-425.

The particular recent cosmic-ray experiments, the significance of which is discussed in this article, are (1) as yet unpublished results of work by Millikan and Cameron on absorption coefficients of cosmic rays on high mountains and at great depths in mountain lakes, (2) recent experiments by Millikan and Bowen on the absorption of gamma rays in mountain lakes, (3) new experiments in the Norman Bridge Laboratory by Chao on gamma-ray absorption, and (4) experiments by Bothe and Kohlhörster and by Curtiss on coincidences obtained with the use of cosmic rays in Geiger-Müller ionization counters.

The authors revealed, in accord with Regener's finding, a very weak, very penetrating radiation at great depth beneath the surface of Gem Lake, 300 feet and more, due, according to the atom-building hypothesis, to the formation of the heavy and rarer elements out of hydrogen. They also revealed at great altitudes on mountain peaks the steeper ionization-depth curve predicted by the Klein-Nishina formula from the hypothetical formation of helium out of hydrogen.

The penetrating power of the softest of the cosmic rays was found to be roughly five times that of these gamma rays of Th C^{11}. This relative penetrating power corresponds, according to the Klein-Nishina formula, to an energy of the softest cosmis rays about ten times that of these hardest gamma rays, and this is also the relative energy of the gamma rays from Th C^{11} and the energy of the softest cosmic ray as computed from the Einstein equation, the Aston curve and the assumption that the softest cosmic ray is produced by the formation of helium out of hydrogen. These facts support strongly the atom-building theory.

The experiments are of great importance because they show that beta rays of the enormous energies involved in the cosmic rays have a penetrating power of the same order of magnitude as the cosmic rays themselves. This is a new and an important discovery, and it is the whole significance of these experiments.

Thus if energies of considerablv more than 500 million volt-electrons could be established, then the theory of atom building in interstellar space as the source of the cosmic rays would have to be abandoned.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(64) GEOPHYSICAL NOTES ON CALIFORNIA AREA

By Paul B. Whitney

The Oil and Gas Journal, vol. 29, No. 32, 1930, pp. 32, 146-153.

The author expresses his confidence that geophysical methods will be extensively employed in California for solution of unknown structural onditions, particularly in the San Joaquin and Sacramento Valleys, as nearly ll of the geophysical methods (electrical, electromagnetic, torsion balance, eismograph, and magnetic) have given practical results in California.

Some results of geophysical surveys carried out in California are xplained, based on curves, graphs, isograms, and profiles given in the rticle.

The outlook for the future application of geophysical methods in alifornia is especially promising, taking into consideration that the cost of stablishing and maintaining an efficient geophysical department is less per ear than the cost of one dry hole, thus, with expectation of but one new discovery in two years time, the maintenance of a strong geophysical department s economically more than justified for any oil company.—W. Ayvazoglou.

(65) GEOPHYSICAL PROSPECTING IN 1930

By Donald H. McLaughlin

Mining and Metallurgy, vol. 12, No. 289, 1931, pp. 22-26.

The increasing use of geophysical methods by geologists and engineers during the past year is mentioned as a significant and an encouraging ign.

The relation of geophysical and geological work has become increasngly clear.

A slump in geophysical exploration was noticeable in the Gulf Coast egion during the past six months on account of the contrast to the great ctivity at the beginning of the year. The subsequent sudden decrease in geophysical prospecting in this region can probably be attributed chiefly to the depression in the oil business, rather than to discouragement over results, but to an important extent it was due to the completion of surveys in the most promising areas.

The efforts to secure records from greater depths with the seismic methods have brought about many revisions leading to greater accuracy in time-distance observations. Commercial magnetometer surveys have been greatly restricted during the past six months, but the usual steady accumulation of records from scientific work in this field still continues.

Electrical prospecting during the year continued to be applied in a wide range of geological problems, from structural work in petroleum fields to foundation investigations for dams. In the search for metallic ores, satisfactory results continue to be reported from districts where conditions are suitable for effective work.

In conclusion the author mentions the following three meetings held during the year that were of particular importance with respect to presentation of papers on geophysical prospecting and for the exchange of information: (1) The American Institute of Mining and Metallurgical Engineers, (2) the American

Association of Petroleum Geologists, and (3) the Fourth General Assembly of the International Union of Geodesy and Geophysics held in Stockholm, Sweden.

The widening interest in geophysical prospecting in England, the publication of the special supplement to Gerland's Beiträge zur Geophysik, entitled Ergänzungshefte fur Angewandte Geophysik, the appearance of the Boletin de la Asociacion Geofisica de Mexico, as well as the work of the U. S. Bureau of Mines, are mentioned.--W. Ayvazoglou.

(66) GEOPHYSICAL PROSPECTING POSSIBILITIES FOR TIN IN THE FEDERATED MALAY STATES

Editorial note

The Mining Journal, London, vol. 170, No. 4956, 1930, pp. 658-659.

This is a portion of the report on the application of geophysical methods of prospecting for the investigation of tin ores. The report was made by Mr. Broughton Edge based on his visit in the Federated Malay States from July 22 to August 2, 1929. It embodies the conclusions arrived at after discussion with the Director and other members of the F. M. S. Geological Survey Department, together with visits to the principal tin producing centers in Perak and Selangor.

The following kinds of tin deposits were investigated:

1. Alluvial and residual tin deposits.
2. Sulphide bearing tin-pipes in limestone.
3. Sulphide bearing tin lodes in granite.
4. Sulphide bearing tin lodes in schist.

The conclusions drawn read as follows:

> Geophysical methods of prospecting, in their present stage of development, can not be applied extensively to the mining fields in Perak and Selangor which were visited -- or to those in other parts of the F. M. S. where the modes of occurrence are similar.
>
> In the cases of alluvial and eluvial tin deposits there is little prospecting of success by any geophysical method, but the sulphide bearing tin lodes and pipe deposits occurring in granite, schist, and limestone present more favorable conditions. There is good reason to believe that certain of the geoelectrical methods would be effective in locating them.
>
> In particular, important possibilities are presented by the sulphide bearing tin-pipes which are characteristically developed in the limestone country along the eastern flank of the Kledang Range (Kinta) and if arrangements could be made for a geoelectrical examination of

the ground which extends between Lahat and Selibin (Kinta district) there would be good prospects of success.

In some of the tin fields it is possible that occasions may arise in which data are required regarding the depth and configuration of the limestone surface over large areas, in which the depth of alluvium is too great to permit a thorough boring compaign (e.g. 200 feet or more). Under such circumstances it is likely that a seismic survey would prove effective.

In the Batu Arang coal field it is probable that some useful work could be carried out by the gravimetric method. This would be limited, however, since the topography over the great part of the field is too rough to permit a general application of the system.--W. Ayvazoglou.

(67) LES HOMOLOGIES PODOLIENS-KARPATIQUES; LEUR APPLICATION AUX RECHERCHES GÉOPHYSIQUES DANS LA ZONE SUBKARPATIQUE

(PODOLIA-CARPATHIAN HOMOLOGIES; THEIR APPLICATION TO GEOPHYSICAL INVESTIGATION IN THE SOUTH CARPATHIAN ZONE) (IN POLISH)

By W. Teisseyre

Compte Rendu du 1-er Congrès de la Géologie du Pétrole à Lwow, 14-15 Dec., 1929, pp. 37-65.

After a detailed geological description of the region the author mentions the directions for geophysical investigations based on a series of displacements and warpings in Podolia which, he states, agree with the details in the changes established by recent surveys. The positions of culminations and depressions with regard to the dislocations in the foreland will become valuable by the fact that, after having cancelled the illusory culminations, the comparison of the intervals between the main culminations with those between the great structural lines of the foreland can be established.--W. Ayvazoglou.

(68) DE L'APPLICATION DES MÉTHODES GÉOPHYSIQUES AUX RECHERCHES DE LA GÉOLOGIE DU PÉTROLE DANSLES KARPATES ET L'AVANT-PAYS

(ON THE APPLICATION OF GEOPHYSICAL METHODS OF PROSPECTING GEOLOGICAL STRUCTURE OF PETROLEUM FIELDS IN THE CARPATHIAN MOUNTAINS AND THE FORELAND (IN POLISH)

By E. W. Janczewski

Compte Rendu du 1-er Congrès de la Géologie du Pètrole à Lwow, 14-15 Dec., 1929, pp. 81-97.

The author reviews the principal methods of geophysical prospecting (gravimetrical, magnetic, radioactive, geothermic, seismic, electrical) and characterizes the kinds of indications which can be furnished by these methods on the nature of the subsoil.

He discusses the use of the Sterneck pendulum for the study of the distribution of the gravity anomalies in the Carpathian Mountains and the foreland and believes that these investigations will contribute to the determination of the main lines of deep tectonics of these regions, as well as their relationship to the Podolian plateau.

In speaking of the advantages established by the application of the method of artificial seismic oscillations, he emphasizes the importance of combining it with the gravimetrical method in order to obtain a more exact representation of the subterranean structure of the foreland of the Carpathian Mountains.

The other methods are discussed with reservation, owing to the local conditions of the peripheral depression filled up by a series of monotonous Tertiary layers in which very saline underground waters are circulating.--Author's abstract translated by W. Ayvazoglou.

(69) TRAVEAUX EN TERRAIN EXECUTÉS PENDANT L'ANNEÉ 1929

(FIELD WORK CARRIED OUT DURING THE YEAR 1929)

By J. Morozewicz

Bulletin du Service Géologique de Pologne,
vol. 5, No. 3-4, 1930, p. LXXIII.

In Morozewicz's report on field work carried out in Poland during 1929 the following geophysical investigations made under the direction of the geophysicist E. W. Janczewski are mentioned:

1. In Kujawach, near Wloclawka. -- Seismic and gravimetrical methods were applied. Gravimetrical measurements were made at 137 points.

2. In the Carpathians (between Stryj, Bolechow, Rozniatow, Zawoj, Kalusz, and Turza Wielka).--Seismic method of prospecting was used.--W. Ayvazoglou.

(70) PROSPECTING WORK OF THE AZNEFT (IN RUSSIAN)

Editorial note

Azerbeidjanskoe Neftianoe Khoziaystvo,
vol. 10, No. 11, 1930, pp. 145-146.

The results of the geophysical prospecting work carried out during the years 1928, 1929, and 1930 are briefly summed up as follows:

1. Magnetic method: Magnetic anomalies in the region of Nefte-Chala proved to be in a distinct relation to the geological structure of the region. The dependance of these anomalies on the presence of magnetite in the Tertiary sediments is discussed.

2. Gravitational method: The maximum gravity in the region of Nefte-Chala is due to the presence of the lines limiting very dense and less dense rocks, as well as owing to the presence of faults.

Prospecting work on a large scale is to be carried out during 1931 mainly beyond the Baku region.

Electrical prospecting is to be tried out widely, owing to the fact that the results obtained by the gravimetrical and magnetic methods, applied during the past four years, have not been satisfactory.--W. Ayvazoglou.

(71) NOTE ON A COMPARISON OF SUNSPOT NUMBERS, TERRESTRIAL MAGNETIC ACTIVITY, AND LONG-WAVE RADIO SIGNAL STRENGTH

By L. W. Austin

Journal of the Washington Academy of Sciences,
vol. 20, No. 5, 1930, pp. 73-74.

A figure shows a comparison of the monthly averages of sunspot numbers, terrestrial magnetic activity (horizontal range) measured at Cheltenham, Md., and the daytime ratio field strength of signals received in Washington from transmitting stations at Bordeaux, France (FYL) (f = 19.5 kc., λ = 18,900 m.), and at Nauen, Germany (DFW) (f = 23.4 kc., λ = 12,800 m.).

The resemblance of the sunspot curve to the other three is not clear, but the similarity in the changes in magnetic activity to those in daylight signal strength seems to be unmistakable. The resemblance of the Bordeaux signal curve to that of the magnetic activity seems closer even than the resemblance between the two signal curves. The deep drop of both the magnetic and signal values in November (more rarely in December) is especially striking. This early winter drop in signals has often been noticed, and in the case of transmission between Europe and America, has been sometimes ascribed to the proximity of the signal paths to the area of Arctic darkness. It now appears that this and other seasonal variations both in magnetic activity and east-west long-wave signal strength may be due to common cases.--Author's note.

(72) ON ISOSTASY AND RELATED TOPICS

GEOLOGICAL SOCIETY IN WASHINGTON

Journal of the Washington Academy of Sciences,
vol. 20, No. 18, 1930, pp. 441-458.

Abstracts of the following five articles given before the Geological Society in Washington during the spring of 1930 are published:

1. Some problems of mountain structure and mountain history, by R. Longwell (pp. 441-446.)

2. Isostasy: What gravity measurements reveal, by G. R. Putnam (pp. 446-447.)

3. Some problems in isostasy, by R. W. Goranson (pp. 447-450).

4. Geotherms, by A. C. Lane, (pp. 450-454).

5. Isostasy from the geological point of view, by R. T. Chamberlin (pp. 454-458).--W. Ayvazoglou.

8. GEOLOGY

(73) PETROLEUM POTENTIALITIES OF GULF COAST PETROLEUM PROVINCE OF TEXAS AND LOUISIANA

By Donald C. Barton

Bulletin of the American Association of Petroleum Geologists, vol. 14, No. 11, 1930, pp. 1379-1400.

A new vista of the petroleum potentialities of the Gulf Coast petroleum province of Texas and Louisiana has been opened by the developments of the past few years. The coastal salt-dome area has been extended eastward to, and across, the Mississippi River. The area of good production has been extended southwestward to Refugio and may be expected to extend to the Rio Grande; it has been extended southward to Clay Creek, which lies in a hitherto practically nonproductive zone, and seems probably to have been extended eastward to Terrebonne Parish, La. The maximum depth of production has been extended to 7,444 feet, and the stratigraphic zone of good production has been extended down into the middle of the Claiborne. Deep and very deep salt domes have great potentialities, are being discovered in great numbers, but have certain drawbacks. The very deep salt ridges are unknown quantities. An enormously thick potentially productive stratigraphic section is present and offers great possibilities for production on such deep structures. A distinct tendency is shown for an increase of the Baumé gravity and gasoline content of the oil with increasing depth and in part with increasing stratigraphic depth. That change foreshadows a progressive change in the mean character of the oil of the future and gives the only suggestion, as yet, of a possible downward limit to production. The general magnitude of the recoverable reserves of oil in the Gulf Coast area of Texas and Louisiana at a shrewd guess is: surely at least, 3,500,000,000 barrels, probably at least 5,500,000,000 barrels and possibly at least 10,000,000,000 barrels.--Author's abstract.

(74) A STATISTICAL EXAMINATION OF THE SENSITIVITY OF A WATER TABLE TO RAINFALL AND IRRIGATION

By B. H. Wilsdon and R. Partha Sarathy

Memoirs of the Punjab Irrigation Research Laboratory, Lahore, vol. 1, No. 1, 1927, pp. 1-51.

The records collected in this article on a series of well observations in irrigated tracts of the Punjab from 1895 to 1926 constitute very valuable data on the sensitivity of a water table to rainfall and irrigation. In the summary of the first part of the article the authors say:

1. The analysis of well records and irrigation and rainfall statistics enables significant regressions to be established between the distribution of rainfall and irrigation throughout the year, and the annual fluctuations of the well levels.

2. The regression curve shows a constant characteristic in the occurrence of a maximum affect of irrigation and rainfall during the monsoon. A second maximum during the winter months is more variable in incidence as is also the occurrence of negative values of the regression.

3. For variations of the monthly irrigation and rainfall within the range of the standard deviations it is found that on the average approximately one-third of the water added to the surface of the soil during the year percolates to the water table.

4. The application of the regression curves in predicting the effect of restriction if irrigation is indicated.

5. A rough calculation shows that not more than one-third of the annual rise of the water table may be attributed to leakage from main canals and branches.

6. The slow changes in the well levels, when compared with the computed addition to the water table from irrigation rainfall and leakage from canals indicate that a well drained "doab" (land bounded by two rivers) is capable of maintained equilibrium. The steady rise in other canals is largely attributable to the absence of drainage, rather than to excessive percolation load.

In the second part of the article the authors give some calculations, the purpose of which is to obtain a mathematical curve showing the average effect of rainfall and irrigation in each month of the year on the well levels.

The necessary data for the calculation of the regression constants for each distributary are given in the following four tables:

Table I. Yearly values of the June or October series of:

(a) The observed depth of water.

(b) The polynomial value of this depth.

(c) The divergence (δd) of the observed from the polynomial value of D.

Table II. Give the constants of the polynomial fitted to W for the years shown.

Table III. Sums of squares and products.

Table IV. Matrix of co-factors.--W. Ayvazoglou.

(75) STATISTICAL STUDIES OF THE HISTORIES OF WATER-TABLES AS AFFECTED BY IRRIGATION AND RAINFALL

By B. H. Wilsdon and R. Partha Sarathy

Memoirs of the Punjao Irrigation Research Laboratory, Lahore,
vol. 1, No. 2, 1928, pp. 1-24.

In the first part of the article the authors describe the results of an analysis of the relation between annual fluctuations of the water-table and the applied irrigation and rain water for a series of regions. The method adopted was:

1. To weight the data of rain-gage stations and observations wells, so that their records may be as truly representative as possible of the whole area.

2. To combine the weighted rainfall with the recorded irrigation in such a way that the total water applied, assumed uniformly distributed over the area W, may be represented as six independent variables of a fitted polynomial of the fifth order.

3. To eliminate secular changes from the weighted record of well fluctuations by fitting the best exponential curve.

4. To correlate the change in average well level, corrected for slow change with the constants of the polynomial fitted to the W distribution.

The regression curves so obtained indicate a considerable variation throughout the year in the proportion of water which reaches the water-table from each application. Common features are a high proportion (one-third or more) during the monsoon when the humidity and intensity is high, and a more variable effect during the winter and early spring. The results in general confirm those obtained in a preliminary investigation by a similar method in a previous memoir but are statistically more reliable.

The numerical data are discussed and illustrated by diagrams.

In the second part of the article a detailed mathematical discussion of points arising in the analysis is given.

The necessary data for the calculation of the regression coefficient are given in the following four tables:

Table I gives the yearly values of $\delta \alpha$ (annual rate of rise of water-table) actual as well as those calculated from the regression formula with the exponential slow changes.

Table II gives the constants of the polynomial fitted to W for the year shown.

Table III. Sums of squares and products of the above-mentioned constants.

Table IV. Matrix of co-factors of the determinants in Table III.--W. Ayvazoglou.

(76) A STATISTICAL EXAMINATION OF THE DISCHARGE OF THE INDUS AT SUKKUR AND ITS RELATION WITH UPSTREAM SITES

By B. H. Wilsdon and R. Partha Sarathy

Memoirs of the Punjab Irrigation Research Laboratory, Lahore,
vol. 1, No. 3, 1929, pp. 1-40.

The work described in this article was taken up at the request of the Indus Discharge Committee in September, 1928. The ultimate aim of the investigation has been defined as the determination of "the history of the water of the Indus and its tributaries during its passage through the Punjab and Sind to Sukkur." The desiderata of any acceptable formula were defined by this committee as follows:

(a) It must satisfy data available,

(b) more completely than any other formula, and

(c) must be capable of forecasting.

The sites at which discharge observations on the Indus and its tributaries were made are shown in a map.

In conclusion the authors emphasize the main deductions made from the statistical results, and distinguish lines along which further investigation appears profitable.

They say:

1. Regeneration appears to be quite definitely a real phenomenon determined by the time elapsed since high floods and to some extent by rainfall and associated humidity.

2. A formula has been developed which appears to be capable of predicting differences in discharge between upstream sites and Sukkur from a knowledge of the upstream discharges and the rainfall. This is of course not a prediction formula in the true sense. It affords hope of a true prediction formula being discoverable if reliable relations between rainfall in the catchments and discharges can be substantiated.

3. It is not at present possible to predict what effect a considerable disturbance in regime by a withdrawal will have at a downstream site although the absence of secular trend in recorded discharges proportionate to the very large increase in withdrawals which has taken place in the Punjab points to the ultimate establishment of regenerative conditions.

4. The probabilities of shortage in supply at Sukkur during the cold weather have been worked out on the assumption that the full Sind indent must be maintained. The withdrawals do not so greatly increase

the changes of shortage as to put the possibility of accommodation of the small Punjab demands by Sind completely out of court.

Full tabular matter has been collected in the appendix.--W. Ayvazoglou

(77) A HYDRODYNAMICAL INVESTIGATION OF THE FLOW OF LIQUID IN A SATURATED POROUS MEDIUM SUCH AS A SOIL

By N. K. Bose and B. H. Wilsdon

Memoirs of the Punjab Irrigation Research Laboratory, Lahore,
vol. 2, No. 1, 1929, pp. 1-17.

In the introduction to the article Wilsdon points out the difficulties both theoretical and experimental, in studying the flow of liquids in porous media. The laws applied in hydrodynamics may be expected to aid in understanding and controlling the movements of a water-table, this subject being of great importance to the Punjab. Since the introduction of irrigation the water-table has risen over large tracts at an alarming rate. In some areas waterlogging on an extensive scale has resulted; in others, land once fertile has become saline and unculturable due to the nearness of the water-table to the surface. The further spread of both these evils, results of the same cause, calls for immediate and energetic remedial and preventive measures, neither of which can be confidently designed without considerable advances in theoretical knowledge. Moreover, without such knowledge it will be impossible to devise proper experimental methods. A brief review of applicable methods is therefore given in this article.

The second part of the article deals with applications of the mathematical treatment developed to ascertain simplified problems of practical importance. The mathematical work in this part is due to Bose. It has been constantly kept in view to obtain solutions in such a form that it will be possible to compare model experiments on viscous liquids with observations on the water-table.

Fundamental hydrodynamical equations applicable to the problems are deduced and the relation between the transmission constant of a soil and the viscosity of the model fluid is demonstrated.

Cases of percolation from a line course such as a canal, with and without distributed surface sources equivalent to the rainfall and irrigation load are discussed.

Unsteady motions corresponding with these cases are discussed.--W. Ayvazoglou.

9. NEW BOOKS

78) Angenheister, G. Angewandte Geophysik (Applied Geophysics). Bearbeited von H. Haalck, W. Heine, J. N. Hummel, K. Jung, H. Martin, O. Meisser, H. Reich. XII and 556 pages with 253 figures. Price, stitched, R.M. 52; bound R.M. 54. 1930. Akademische Verlagsgesellschaft m.b.H., Leipzig. Contents: Geological bases of applied geophysics, by H. Reich; Gravimetric method of applied geophysics, by Karl Jung; Air-seismics and ground-seismics, by O. Meisser and H. Martin; Magnetic methods of applied geophysics, by H. Haalck; Electrical methods of applied geophysics, by J. N. Hummel and W. Heine; Practical application of electrical methods, by W. Heine; Radioactive methods, by J. N. Hummel.

79) Haarmann, Erich, Prof. Dr. Die Oszillationstheorie. Eine Erklärung der Krustbewegung von Erde und Mond (The Oscillation Theory; An Explanation of the Movement of the Crust of the Earth and of the Moon). 260 pages, 78 figures, 1 table. Verlag R. Enke, Stuttgart 1930. Price, stitched, R.M. 17.00, bound, R.M. 19.00.

80) Hermanns, Hubert. Techno-Diktionar, Deutsch-Englisch-Italienisch. (Technical dictionary, German-English-Italian). 432 pages. Berlin, Hubert Hermanns, 1929. Price, $3.75.

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DEPARTMENT OF COMMERCE -- BUREAU OF MINES

GEOPHYSICAL ABSTRACTS[1]

No. 23

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– Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(83) DREHWAAGEMESSUNGEN IM RIES BEI NÖRDLINGEN

(TORSION BALANCE MEASUREMENTS IN RIES, NEAR NÖRDLINGEN)

By A. Bentz and Karl Jung

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 1-22.

The article consists of two parts. The first part is written by A. Bentz and contains a "Geological introduction," in which the structural conditions and hypotheses on the origin of the Ries Mountains are described and an attempt at geological interpretation of the torsion balance measurements is made. The second part, "Measurements and their results," is published by Karl Jung. It contains (1) geophysical measurements already available, and (2) torsion balance measurements. The article is provided with tables and figures.

The translation of the German abstract is given below:

> In the fall of 1928 measurements with the small Gepege torsion balance (1925 model) were carried out in the center of the Ries mountains near Nördlingen. The results showed satisfactory conformity with the pendulum measurements carried out by the Bavarian Geodetic Commission.
>
> The tongue by which the gravity minimum observed in the north of the Ries is extended towards the south coincides with the magnetic vertical intensity minimum in the center of the Ries as established by Haussmann. By making various suppositions on the difference in density it was possible to determine the masses missing in the center of the Ries. The explosion crater is probably 1 1/2 kilometers deep and its slope in the west, south, and east parts reaches a value of 10 to 15°. The corresponding slope in the north could not be established. From the two very different values of the gravity intensity measured in Dürrenzimmern, the value obtained by pendulum measurements in Dürrenzimmern II is correct.--W. Ayvazoglou.

(84) UEBER DIE BESTIMMUNG DER GEOIDUNDULATIONEN AUS SCHWEREMESSUNGEN

(THE DETERMINATION OF THE GEOIDUNDULATIONS FROM GRAVITY MEASUREMENTS)

By Karl Jung

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 81-91.

It is proved that after having taken into consideration the correction by which the effect of the isostatic reduction upon the position of the geoid is eliminated, the gravity values reduced isostatically can well be used for the determination of the geoidundulations. The proceeding, proposed by Hopfner, according to which the gravity values are reduced with regard to the eoid in such a way that no mass-dislocations occur and then the geoidundula-ions result from simple formulas, needs a supplementary correction because he masses lying outside of the geoid are not taken into consideration in opfner's formula system. The correction which is to be applied to this pro-eeding amounts to four to five times the correction which is to be applied o the determinations from gravity values reduced isostatically; therefore it s less favorable than the application of isostatic values. From the spheri-al harmonics development of the surface of the earth, according to Prey, the orrections for both proceedings are calculated to the fifth spherical func-ion. Map representations give a reliable impression of the order of the alues. The details of the mathematical deductions are given in the publi-ation.--Author's abstract translated by W. Ayvazoglou.

The article is followed by two brief notes, one written by Hopfner n defense of his viewpoint and the second is K. Jung's answer to Hopfner's ote.--W. Ayvazoglou.

(85) EIN STATISCHER SCHWERKRAFTMESSER

(A STATICAL APPARATUS FOR GRAVITY MEASUREMENTS)

By H. Haalck

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 95-103.

The effort to replace the difficult and complicated dynamic method f pendulum measurements by a rational method of gravity measurements is as ld as the understanding of the importance of the knowledge of gravity differ-nces on the surface of the earth for the investigation of the earth's crust. he problem of the development of an apparatus for measuring gravities based n the statical principle has been much discussed recently owing to its great mportance for geophysics, geodesy, geology, and mining. Practical attempts o construct such an instrument have been made several times but no results ave been obtained so far.

In this article the author gives the results of experiments made ith a statical apparatus for gravity measurements developed by him during the ast few years.--Author's abstract translated by W. Ayvazoglou.

(86) ERHÖHUNG DER EMPFINDLICHKEIT DER HEBELWAAGE DURCH EIN HORIZONTALPENDEL

(THE INCREASE OF THE SENSITIVITY OF A BEAM-BALANCE BY MEANS OF A HORIZONTAL PENDULUM)

By G. Schmerwitz

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 104-108.

In order to be able to determine the vertical gradient of gravity $\frac{\partial^2 W}{\partial z^2}$ with an accuracy equal to that with which the horizontal values are determined, the relative accuracy of beam-balances, which is about 10^{-8}, must be increased 200-fold. In this article the author shows how the sensitivity of such a balance may be increased to an even higher value by the combination of the beam-balance with a small horizontal pendulum.

Practical application of this principle is given in an example.--Author's abstract translated by W. Ayvazoglou.

(87) INTERPRETATION OF GRAVIMETRIC OBSERVATIONS IN CASE OF ONLY ONE CONTACT SURFACE (IN RUSSIAN)

By B. Numerov

Comptes Rendus de l'Academie des Sciences de l'U.S.S.R.,
May 5, 1930, pp. 569-574.

In one of his previous works (C. R. de l'Academie des Sciences, 1929, No. 4, p. 101), Numerov derived formulas by which the gradients obtained with the aid of Eötvös' torsion balance were put in connection with the gravity anomaly $\triangle g$ established on the whole plane surrounding the point of observation

In this article the author examines the simplest case of the subterranean structure, that of only one contact surface by which the light upper rocks are separated from the heavy rocks lying at greater depth.

Formulas are derived and their application to a particular case is examined.--W. Ayvazoglou.

(88) ON THE CONSTRUCTION OF ISOGAMS BASED ON THE OBSERVATIONS MADE BY A GRAVITATIONAL VARIOMETER (IN RUSSIAN)

By B. Numerov

Comptes Rendus de l'Academie des Sciences de l'U.S.S.R.,
May 5, 1930, pp. 575-579.

Mathematical calculations and a graphical method by which the constru tion of the isogams may be carried out are discussed.--W. Ayvazoglou.

(89) ISOSTASY: A CRITICAL REVIEW

By M. King Hubbert and F. A. Melton

The Journal of Geology, vol. 38, No. 8, 1930, pp. 673-695.

The underlying theory pertaining to the shape of the earth is briefly reviewed. Hopfner's recent inquiry into the problem is cited in which he has shown that by means of strict potential theory isostatic reductions are highly questionable, and, furthermore, that there is no need to postulate an isostatic state in order to account for gravity data. High points of geologic and seismo ogic data are also cited. The conclusion is that the theory of isostasy rests upon a much more insecure foundation than has heretofore been supposed.--Author abstract.

2. MAGNETIC METHODS

(90) MAGNETOGRAM SERVICE IS INAUGURATED

By L. G. E. Bignell

The Oil and Gas Journal, vol. 28, No. 41, 1930, pp. 41 and 119-120.

The Oil and Gas Journal has inaugurated a new service which should prove of benefit to the geophysical departments of the production companies, especially to those doing magnetometer work.

This new service will consist in securing and printing telegraphic information of magnetic storms as they occur and will be based upon information furnished by the U. S. Coast and Geodetic Survey from its Tucson, Ariz., station. No attempt will be made to interpret the data furnished.

Suggestions as to how this service may be improved will be welcomed, and it is hoped that it will prove of distinct economical and practical benefit to the geophysical branch of the industry.--W. Ayvazoglou.

(91) ON THE DISTRIBUTION OF PERMANENT REPEAT-STATIONS

By J. A. Fleming and H. W. Fisk

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 74-80.

In this article the authors notice the success obtained by the network of repeat-stations existing and the necessity of increasing the number of these stations.

Based on the data taken from the provisional isoporic charts (charts showing lines of equal annual-change) which have been prepared in the Department of Terrestrial Magnetism of the Carnegie Institution of Washington for each of the elements: declination, inclination, horizontal intensity, vertical intensity, and total intensity (these charts are presented in a separate communication entitled "Isopors and isoporic movements"), the authors mention a few significant facts which should be taken into account in considering the number and distribution of magnetic observations and sites of permanent repeat-stations, as well as the most advantageous time interval between occupations of the latter.

Two maps showing the locations of observations, repeat-stations and desirable additional repeat-stations (1) in the western hemisphere and (2) in the eastern hemisphere are given. The reasons for the distribution are discussed.

In conclusion the authors say that the indicated positions are by no means the only ones at which repeat observations are needed, but they are offered as a basis for considering some plan of international cooperation which shall insure the reoccupation at regular intervals of a sufficient number of stations all over the globe to supply the necessary data/regarding the secular change in the earth's magnetism.--W. Ayvazoglou.

(92) ANOMALIES OF VERTICAL INTENSITY

By George P. Somers

The Colorado School of Mines Magazine, vol. 20, 1930,
No. 8, pp. 9-12, 25-26; No. 9, pp. 15-19; No. 10, pp. 19-28;
No. 11, pp. 21-23, 40-41; No. 12, pp. 27-30;
vol. 21, 1931, No. 1, pp. 20-24; No. 2, pp. 27-30.

In this series of articles the author makes an attempt to establish the correlation of the anomalies of vertical intensity of the earth's magnetic field with the regional geology of North America based on available government data. As originally planned this work was to cover thoroughly the whole of North America, but in working up the magnetic data the author has found that although there were numerous stations for Alaska, Mexico, and Central America, these stations were so widely scattered that no connection could be shown between the isonomalies for these countries and the geology. Northern Canada was found to be practically devoid of magnetic stations with the exception of a few along the Alaskan boundary. Consequently the major portion of the work was concentrated in the United States and southern Canada.

Contents of the articles: Introduction, Acknowledgments, Definitions.

Chapter I. Method of procedure:

(a) Selection of a base map.
(b) Preparation of magnetic data.
(c) Sources of geologic data.
(d) Selected bibliography.

Chapter II. Interpretation and summary.

Chapter III. Interpretation of results in the United States (The States are arranged alphabetically rather than by regions or districts in order to aid the reader in readily locating the territory in which he may be interested.

Chapter IV. Conclusions.

--W. Ayvazoglou.

(93) UEBER DIE STERNTÄGIGE SCHWANKUNG DES ERDMAGNETISMUS

(ON THE SIDEREAL-DAY VARIATION OF THE EARTH MAGNETISM)

By Ad. Schmidt

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, p. 134.

The diurnal variation of the earthmagnetic force includes one part which depends on sidereal time, therefore involves so far a hypothetical assumption. Its definite determination would be of importance, as it would prove that the observed daily course does not represent the real solar-day variation; therefore corresponding corrections in the investigations carried out with regard to this variation are required. This is true also for the lunar variation, so far as this variation is considered for single phases of the moon.

From this determination a conclusion on the existence of a permanent homogeneous magnetic field in the sphere surrouding the earth can be drawn. Its true nature can not be derived directly from the phenomena observed on the surface of the earth, as its effect seems to undergo changes caused by phenomena resulting from induced currents produced in the earth's body, as well as in higher atmospheric zones, by the rotation of the earth.

But under acceptable assumptions for the electrical conductivity in these two places these changes can be estimated and thus an approximate picture of the external field can be obtained.

The force of its component perpendicular to the axis of the earth (which alone can be determined) is, according to calculations, equal to about 3 γ. The direction of the component coincides with the plane formed by the axis of the earth and the line perpendicular to the ecliptic. Therefore, according to its form the field (which can be determined only in yearly mean value) corresponds to the effect of the magnetization of the sun which, based on Hale's data should of course be at least five times stronger than supposed. But owing to the fact that, according to the recent investigations, there does not exist any noticeable external magnetic effect of the sun whatsoever, the possibility of an explanation based on it must be dropped.--Author's note translated by W. Ayvazoglou.

(94) ON A FURTHER DEVELOPMENT OF THE NEW THEORY OF MAGNETISM

By Kotaro Honda

The Science Reports of the Tohoku Imperial University,
Series 1, vol. 19, No. 6, pp. 745-759.

In this paper a small alteration in the writer's theory of magnetism published two years ago is described. This form of the theory explains the gyromagnetic effect as well as the magnetic deflection of atomic rays in a strong field. The usual explanation of the latter phenomenon by quantum theory is not consistent with the dynamical theory of electrons.

It is also shown that Weiss' and Heisenberg's theories of ferromagnetism are not in a good agreement with experimental facts.--Author's abstract.

3. SEISMIC METHODS

(95) EARTHQUAKES IN ITO AND OBSERVATIONS ON THE VARIATIONS OF THE INCLINATION OF THE SURFACE OF THE EARTH

By M. Ishimoto and R. Takahashi

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 8, No. 4, 1930, pp. 427-458.

The article consists of two parts; the first, "Observations made in Ito and Kawana" is written by R. Takahashi, and the second, "Discussion on the seismic phenomenon in Ito," by M. Ishimoto.

The translation of Takahashi's abstract reads as follows:

> A great number of earthquakes has been observed from February 14, 1930, to April 22, 1930, in the region of Ito, a city situated at the eastern border of the Idu peninsula. In order to study the movement of the earth crust caused by these earthquakes one pair of horizontal pendulums (clinographs made of melted silica invented by Prof. M. Ishimoto) has been set up in Ito for observing the variations of the inclination of the surface of the earth; observations were made from March 12.
>
> A similar installation was arranged in Kawana on March 19 and the observations were continued in both places up to June 30. The sensitivity of the clinograph in Ito has been adjusted so that one centimeter of deviation could be observed for one second of inclination; the sensitivity of the clinograph in Kawana was twice as great as that of the clinograph in Ito. The clinographs were placed in cellars excavated in the volcanic lava.
>
> The curves of variations of inclination obtained by observations made in Ito and Kawana from March 12 to May 31, as well as the curve of the mean temperature of the air observed in Ito, are given in a figure (fig. 6). In this figure the different quakes are represented according to the data given in a table.
>
> Another figure (7a) represents the vector diagram of the variations of inclination in Ito adjusted to the curves shown in figure 6. Figure 7b represents the vector-diagram of the variations of inclination in Kawana.
>
> From figure 7a it can be seen that the strong quakes are grouped near the periods in which the variations of inclination are rapid and simple; they are produced in two characteristic directions, those from the west and the south. These are certainly the two characteristic directions of the Ito block. In case of slight quakes the variations of inclination remain comparatively weak and complicated. In this period the curve has sometimes the form of a zigzag and sometimes that of a cylinder; this shows the influence of the temperature variations

of the atmosphere. Moreover, it is certain that some quakes correspond to an inclination towards the west, and others towards the south, thus forming two different series which are in close relation with their hypocentral positions, as shown in a figure (8).

The fact that the active period of quakes entirely coincides with the period of noticeable variations of inclination is well in accord with the results obtained by the observations carried out in Kawana; this is shown in figure 7b. It was determined that the characteristic direction of the Kawana block was towards the west.

From the results obtained in Kawana (fig. 6) the variations of inclination of the terrain due to the ocean tide were clearly shown besides.

Ishimoto sums up his "Discussion on the seismic phenomenon in Ito" s follows:

1. A great number of earthquakes was observed near the city of Ito; they were divided into two groups. Amongst them there were some strong quakes which could be felt even in Tokyo. It was observed besides that one part of the quakes was produced consecutively during the time of low tide.

2. Many examples of earthquakes which resemble the quakes observed in Ito could be established everywhere in Japan, although this importance was always smaller. From these facts we may draw the conclusion that there is no essential difference between a group of slight quakes and repercussions.

3. According to the results obtained from the precise survey carried out in the region of Ito, the existence of two blocks at the moment of the great earthquake of 1923 was established; during the last survey it was found that one of the two blocks was divided into several parts. On the other hand there was a maximum raising of the terrain located near Kawana, very close to the epicentral region. From these facts the conclusion was drawn that the quakes caused the inclination of the block and the raise of the terrain.

4. In the two figures showing the vector-diagram the predominent directions which correspond to the appearance of the quakes can be seen besides. This phenomenon can be exactly compared with that observed in Miyadu immediately after the great Tango earthquake. The fact that the two blocks of Ito and Kawana are inclined towards the west proves the rise of the littoral region; this agrees well with the evidence seen by the eye.

5. The local rise of the surface of the earth is explained by the results of magnatic injection into the crust radiating by the seismic waves. According to the successive determination of the hypocentral positions it was established that there is something which rises from the depth of the earth crust towards its surface. This is

certainly magma, as this something is capable of moving; this may cause the drawing of the conclusion that it is the origin of the quake. From the distribution of the original movements of the seismic waves it can be generally stated that a dike is formed in the region of the epicenter; but this will not add anything to the explanation of the origin of the quake.

Eleven figures illustrate the article.--W. Ayvazoglou.

(96) THEORIE DER 3-SCHICHTEN SEISMIK

(THEORY OF THE THREE-LAYER SEISMICS)

By Oswald V. Schmidt

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 37-56.

This work deals with the theory of blasting-seismics applied to three layers located at any angle of incidence.

The travel-time curves are calculated, based on the given structure of the earth's crust. The most interesting apparent velocities in layer number three are mentioned: $v_{3+} = \infty$; v_{3+} = negative; $v_{3+} = v_{3-}$. Formulas are derived by which the structure of the three layers can be calculated from the given travel-time curves. It is shown that the layers (except layer one), in order to be established by the method of the first charge, must have a certain minimum magnitude. It is shown that the highest apparent velocity of layer three (v_{3+}) does not indicate always an ascent; even a descent of layer 3 is possible under certain conditions. A series of examples are calculated.--Author's abstract translated by W. Ayvazoglou.

(97) BEITRÄGE ZUR EXPERIMENTELLEN SEISMIK

(CONTRIBUTIONS TO EXPERIMENTAL SEISMICS)

By Walter Korte

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 57-68.

Two seismic methods can be used for the investigation of the subsoil. By the first, the course of the direct, refracted, and reflected seismic wave may be determined from the time necessary for its traveling from the point of disturbance to the various stations; by the second the nature of the oscillations appearing and the dimensions of the oscillating layer can be derived from the amplitudes and the periods obtained.

The second method requires especially a reliable record of the actual movement of the subsoil. A correct reproduction of the period and amplitude of the oscillation of the ground, not distorted by the properties of the seismograph used, is therefore essential.

The author investigated the reliability of the different seismographs by studying the natural movements of the ground, as well as artificial disturbances caused by railway trains and explosions, using seismographs of different construction.

The article is divided into the following three parts:

1. Examination of the seismographs.
2. Recording of the disturbance of the ground caused by perceptible and not perceptible reasons with regard to the horizontal and vertical component.
3. Travel-time curves and periods of the transversal waves caused by artificial explosions.

Tables and seven figures illustrate the article.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(98) SWEDISH GEOELECTRICAL PROSPECTING METHODS

Editorial note

The Mining Magazine, 1930, vol. 43, No. 4, pp. 245-248
and vol. 43, No. 5, pp. 310-313.

This is a pamphlet published by the Geological Survey of Sweden for the fourth General Assembly of the International Union of Geodesy and Geophysics. It comprises a summarized survey of Swedish geoelectrical methods by K. Sundberg, H. Lundberg, and J. Ecklund. The paper contains a résumé of the theory of the various methods and then proceeds to possibilities of their application, finally summarizing the results obtained.

The article may be divided into two parts, the first dealing with the electrical properties of the earth's crust and the stratigraphical and structural problems, and the second with the description of geoelectrical surveys carried out in different countries.

The results obtained by these surveys are briefly given below:

Skellefte District, Northern Sweden. - An extensive geoelectrical investigation has been carried out in this district. Over 20 ore-fields, with about 50 ore-bodies have been found by investigating over 400 square kilometers of the ore-bearing formation, which consists of metamorphic volcanics overlain by graphitic slate.

Places of the most important discoveries in the Skellefte district are enumerated.

Investigations in the Caledonian Folding Zone of Sweden and Norway. - The best results have been obtained in the newly discovered districts in Sweden, where some ore bodies have been located and at the Björkåsen mine in

Norway, where the course of the ore-bearing graphite-slate zone has been followed in detail.

Central and Southern Sweden. - Electrical investigations have been carried out on a number of ore deposits in the old mining districts of central and southern Sweden. There were many occasions on which the accuracy of the geoelectrical methods could be checked on known ore bodies.

Finland. - Geoelectrical surveys have been executed in southwestern Finland on sulphide deposits and in eastern Finland on copper and pyrite deposi

Central and South Europe. - The possibility of discovering new ore bodies in this region is small owing to the fact that most of the ore bodies at or near the surface in central and southern Europe have been worked out. Surveys have been carried out (1) on pyritic deposits in folded schists, (2) on zinc and lead deposits in limestone, and (3) on vein-form deposits.

South Africa. - The most important investigations in South Africa have been carried out in the copper districts of Namaqualand and Northern Rhodesia.

Billiton. - A most interesting investigation was carried out in the tin district of Billiton (Netherland East Indies).

Newfoundland. - Prospecting conditions in Newfoundland are very similar to those in the Skellefte district. The greatest discovery was made at Buchan's mine.

Pre-Cambrian Area of Canada. - Large areas have been surveyed geoelectrically at Rouyn, Quebec, and in Manitoba.

Deposits of Native Copper in Michigan. - An experimental survey on th copper deposits of Michigan showed the possibility of locating at least the better copper lodes, despite the low content of conductive minerals.

Sulphide Deposits Within the Pre-Cambrian Areas of the Western United States. - Within pre-Cambrian the small areas not hidden by younger formations in the western United States, some rather important sulphide deposits have been found.

Ore Deposits of Alaska, British Columbia, and Western United States. Important geoelectrical surveys have been carried out on sulphide deposits of the North American cordillera region, belonging to a rather deep-seated type of Mesozoic age. A remarkable geoelectrical investigation was made on the molybde deposit at Questa, N. Mex.

Zinc-Lead Deposits of the Mississippi Valley. - Fairly large geoelectrical investigations were carried out in the Mississippi Valley region.

Practical Results of Structural Work. The earliest application of Swedish geoelectrical methods to structural work was made in Austria in 1925. The methods have been used to map salt domes, anticlines, and domes and to race faults. Surveys carried out in Poland, Roumania, Austria, Czechoslovakia, Germany, United States, and Canada are mentioned.--W. Ayvazoglou.

(99) RESULTS OF EARTH-CURRENT OBSERVATIONS AT HUANCAYO MAGNETIC OBSERVATORY, 1927-1929

By O. H. Gish and W. J. Rooney

Terrestrial Magnetism and Atmospheric Electricity,
vol. 35, No. 4, 1930, pp. 213-224.

The apparatus and equipment used and the natural features concerned with the measurement of earth-current gradients at the observatory maintained y the Carnegie Institution of Washington near Huancayo, Peru, are described. A dual system of electrodes is installed and the potential differences are registered by a recording potentiometer. Although the region embraced by the measuring system is fairly flat, evidence is found which indicates that the general northwesterly direction of water course and mountain ridges here doubtless influences the direction of the electric currents.

The character of the diurnal variation, as derived from records for all complete days, is exhibited by means of charts and tables and the Fourier coefficients of the diurnal variation are given for the three-year means grouped by months.

The mean diurnal-range of the northward component is 2.83 mv. per kilometer. The maximum occurs at 9^h, the minimum at 15^h (75° west meridian mean time), and the amplitudes during the hours of darkness are relatively small. The same description applies to the component at right angles to this (values being considered positive for currents flowing eastward) except that the main range (3.26 mv. per kilometer) is somewhat greater. The direction of the current is northwestward from $2^h.5$ to $12^h.5$ and southeastward the remainder of the 24-hour period. The times of the daily maximum and minimum are constant throughout the year, which is contrary to the findings at Berlin, Ebro, and Watheroo. However, in general agreement with the results at these other places, the mean diurnal-range changes with season, the principal minima (northward 1.89 mv. per kilometer, eastward 2.18 mv. per kilometer) occurring in June and maxima (northward 3.50 mv. per kilometer, eastward 4.00 mv. kilometer) in March and October.

Disturbances (variations of relatively short and irregular period with amplitudes considerably greater, in the average, than those of the diurnal variation) predominate during the daylight hours.--Authors' abstract.

(100) THE DETECTING OF ROCK SALT BY THE METHODS OF ELECTRICAL SURVEYING

By T. Alty and S. Alty

Canadian Journal of Research, vol. 3, No. 6, 1930, pp. 521-525.

The experiments on the application of electrical surveying methods for detection of rock salt deposits are described.

The experiments were undertaken with the object of obtaining:

1. An estimate of the depth of the upper surface of the rock salt.

2. An estimate of the depth of the upper surface of the brine cavities at the base of the boreholes.

The "single electrode probe" method, as described by Eve and Keys (Applied Geophysics, Cambridge Univ. Press, 1929, p. 107) was used. A diagram illustrating the method is given.

The results, represented by three graphs, show that these methods give definite indications on the depth of the deposit when the latter is as much as 600 feet below the surface.--W. Ayvazoglou.

(101) THE METHOD OF THE GROUND RESISTIVITY MAP AND ITS PRACTICAL APPLICATION

By C. and M. Schlumberger

The Canadian Mining and Metallurgical Bulletin,
No. 226, February, 1931, pp. 271-294.

The object of the present paper is to discuss, from a geological point of view, the practical results obtained by the authors with the method of the "resistivity map of the subsoil" in the study of various mining problems After describing the principles of the method, the authors explain the simple interpretation of the resistivity maps of the ground by a series of examples.

The examples chosen are the following: (a) Three salt-dome structures whose comparison is of interest; (b) three very shallow studies, one concerning an exploration for lignite and the others the tracing of faults; (c) the exploration of Palaeozoic, tilted terrains, covered by a recent overburden; (d) the location of limestone lenses in disturbed formations under an overburden. The authors draw the following conclusions:

> As shown by the different examples described, the resistivity map of the ground is similar to a geological map where the various formations are characterized by their electrical resistivity. This map may be drawn up for a layer of the ground of a given thickness, which may be chosen at will. Such a work for a great thickness (exceeding 100 meters) requires the service of well-trained specialists. The studies at shallow depth, the discussion of which constitutes the major part of the present paper, are, on the other hand, of much easier application, with a simple apparatus and a reliable technique. In spite of their superficial character, they may be of great practical value in all cases where a shallow overburden covers the underlying rocks, a condition which is quite commonly found in flat countries. The method of resistivity map appears, then, not as an abstract science, but as a simple and direct geological process.

The electrical data are sometimes difficult to interpret because the various rocks may possess the same resistivity. This is the reason why verification by pits or drill holes are always indispensable, either to clear up any uncertainties or to give precise information concerning the nature of the deposits. On the other hand, the practical possibility of covering the surface with measurements without incurring large expense, and thus of effecting a continuous exploration, gives to the geologist a greater security in his conclusions. He will have a general view of the problem at hand and will be able to formulate more correctly the hypotheses suggested by the local observations made at the outcrops or in the mining exploration. This is, according to the estimation of the authors, the most important utilization which can be made of the resistivity map of the subsoil.

Ten figures showing places of investigation are added.--W. vazoglou.

(102) ARTIFICIAL MEASUREMENTS UPON ARTIFICIAL BEDS

By Joel H. Swartz

U. S. Bureau of Mines, Information Circular No. 6445,
February, 1931, 9 pp., 14 figures.

In this paper the author describes a series of experimental investitions on artificial strata in order to answer the questions arising during sistivity measurements carried out in 1929 and 1930 concerning the effect of pography on the character of the curves and the depths attained, the ratio true depth to certain radii interpreted as representing depth, etc.

The arrangement and position of aritificial beds are described and own in figures.

Measurements on the beds were made by Lee's method of partitioning, nner's method, and the single electrode probe method, using direct current th potentiometer and milliammeter.

Profiles through the beds along the lines in both hilly and flat des on which measurements were made are given in figures. The conclusions awn by the author read as follows:

> Of the various methods tried, Lee's method of partitioning gives the sharpest, most clear-cut, andmost easily interpreted results. Wenner's method fails because it averages together the two usually quite dissimilar halves of the field. Lee's method of partitioning has the further advantage that it gives a simple depth relationship, which is a constant one. The depth to the stratum displaying the resistivity shown by a given point on the curve is in these experiments always equal to one-third the distance separating the current stakes for that point, as measured beneath the particular current stake position for that point. This relation does not appear to vary with changes in the resistivities

of the beds penetrated--a rather surprising result since it was to be expected that the equipotential hemispheres would be very differently distorted by beds of different resistivities, with corresponding variations in the depth recorded.

In general the single-electrode probe gives less clear-cut results than the method of partitioning and has the further disadvantage of a variable ration between the outer radius, "a," and the true depth.

The necessity for a topographic correction where current stakes are moved during measurements, as in the Lee and Wenner methods, is one of the important results of the present study.

Since the hemispheres center about the current stakes and not about the center of measurement, measurements of depth must be made below the current stake. To refer all measurements to a fixed point, such as the center, differences of elevation between the fixed point and the current stake must be subtracted algebraically from the depth below the current stake, designating as "negative" all points below the center, or other fixed point, and those above as "positive." To correlate the stratum reached with those below the fixed point, it is necessary to correct for the difference of elevation of the stratum between the fixed point and current stake. This may be easily calculated, if the strike and dip of the beds are known, from the formula $h = D \cos \beta \sin \delta$, where h is the difference in elevation desired, D is the distance between fixed point and current stake, δ is the angle of dip, and β is the azimuth angle between the dip-bearing and the bearing of the line joining current stake and fixed point. Nomographs for the graphic computation of depth to a stratum will be found in a paper by Mertie (U. S. Geol. Survey, Prof. Paper 129-C, 1922, pp. 39-52).

The stratum reached is always that lying at a depth a = 1/3 c.c. below the current stake. This fact must always be borne in mind, since two factors, depth and the lateral position of the stake, are involved and must be considered for a proper interpretation of the data.--W. Ayvazoglou.

(103) ELECTRIC CORING

By L. G. E. Bignell.

The Oil and Gas Journal, vol. 28, No. 38, 1930, pp. 33 and 148.

The "electric coring" method has been devised by Conrad and Marcel Schlumberger in order to obtain, under certain conditions, information about the various formations passed through in drilling wells into the earth's surface that is not available to the driller by ordinary methods.

The system is based largely on fact that different classes of rocks present varying degrees of resistivity

A diagram illustrating the measuring apparatus used in the electric oring system is given. The equipment is portable and rapid in operation. The urveying can be done at the rate of about 3,000 feet per hour when the machine s in place.

The work done thus far in several wells near Seminole, Oklahoma City, nd other points in Oklahoma and Kansas has demonstrated the possibility of orrelating numerous electrical key horizons in Mid-Continent oil fields with onsiderable accuracy.

A slightly different technique which can be applied in favorable ases to determine the dip of concealed strata is explained.--W. Ayvazoglou.

(104) GEOELECTRIC PROSPECTING BY A.-C. BRIDGE METHOD

By A. Broughton Edge

Nature, vol.127, No. 3192, 1931, pp. 37-39.

The object of the present article is to describe two methods of sing a form of alternating-current bridge (ratiometer) for electrical prosecting purposes, one of which comes under the first and the other under the econd of the two groups defined by the author, according to the manner in hich the ground and the concealed conductive bodies lying within it are exited and how the resulting electrical field is investigated; (1) Surface otential methods, and (2) electro-magnetic methods.

The principle of the a.-c. potential ratio method and the field proedure of this method, as well as the application of the ratio arm bridge to he simultaneous comparison of magnetic fields are explained and illustrated y diagrams.--W. Ayvazoglou.

(105) POTENTIAL DUE TO A BURIED SPHERE

By J. H. Webb

Physical Review, vol. 27, No. 3, February 1, 1931, pp. 292-302.

The potential distribution due to a buried conducting sphere is assumed as a series of spherical harmonics, and the coefficients are calculated from the usual boundary conditions, making use of the image of the uried sphere and a special relation among tesseral harmonics. The exact olution is indicated and approximate methods are suggested. These lead to sufficiently accurate results when the depth of the center of the sphere exceeds three times the radius. For details, the original paper should be consulted.--Irwin Roman.

5. RADIOACTIVE METHODS

(106) MOBILITY OF IONS IN THE ATMOSPHERE (IN RUSSIAN)

By E. S. Stchepotieff

Journal of Geophysics and Meteorology, Leningrad,
vol. 6, No. 2, 1929, pp. 101-103.

In this article the author makes an attempt to explain, as well as possible, what causes the numerical results of measurements on the mobility of ions carried out in laboratories to differ from those obtained by measurements in the open air.

The difference is made evident by the statement of the results and a comparative table. The methods usually applied under atmospheric conditions are explained and the possible errors due to these methods are mentioned.

The examination of these errors leads to the conclusion that the difference between the results obtained under atmospheric conditions and those in the laboratories may be assigned to the heavy ions contained in the air; the presence of these ions has not always been sufficiently taken into consideration.

The article contains the description of experiments supporting this supposition, corrections introduced in the method of measurement, and gives the results obtained by measurements carried out by the improved method.

Taking into consideration the fact that the measurements of the mobility of the ions in the atmosphere are of real and indisputable interest, the author recommends that the measurements be carried out with great caution by means of special apparatus with very great sensitiveness.

The necessity of dividing the ions into groups and measuring the mobility of each group separately is evident.--Author's abstract translated by W. Ayvazoglou.

6. GEOTHERMAL METHODS

(107) ON THE HEAT GENERATED BY THE DEFORMATION OF THE EARTH CRUST

By Torahiko Tarada

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 8, No. 4, 1930, pp. 377-383.

Any inelastic deformation of the earth crust is accompanied by generation of heat which must be taken into account in all problems concerned with the thermal conditions of those parts of the crust which are subjected to sensible deformation.

In discussing the origin of the heat of hot springs, which is sually attributed to volcanic sources, radioactivity, or chemical processes, he author notices the possibility of mechanical origin of heat; this possibility has so far been neglected, although there are numerous examples of ot springs (Sakhalin, Honsyu, Formosa, Korea, China) distributed along ault lines which could not be associated with any apparent volcanic activity. he second part of the article deals with some calculations on the heat due o continental drift.

As no sufficient data are available at present to make any final ecision on the heat generated by the defomation of the earth crust, Terada roposes that systematic observation with regard to this problem should be rranged.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(108) PRELIMINARY REPORT ON TERRESTRIAL MAGNETISM AND ELECTRICITY AT THE STOCKHOLM ASSEMBLY, AUGUST 14 TO 23, 1930

By J. A. Fleming

Terrestrial Magnetism and Atmospheric Electricity,
vol. 35, No. 4, 1930, pp. 209-212

After a brief description of the functions of the International eodetic and Geophysical Union, its work and previous assemblies, the author entions that at this assembly new statutes for the union to be effective in 931 were discussed and prepared. Other important matters upon which action as taken by the assembly included:

1. Approval of the project for a Jubilee International Polar Year 932-33, as proposed by the Commission on Terrestrial Magnetism and Electricity f the International Meteorological Committee.

2. It was agreed that every means should be promoted to effect the ooperation of the International Research Council and its unions with societies, ssociations, or institutions engaged in work that extends beyond national ines.

3. Provision was considered to bring about more effective distribuion of publications of the union and of each of its associations.

The proceedings of the Association of Terrestrial Magnetism and lectricity are briefly summarized.

Attention was given to economic aspects of the association's activiies. These included the application of geophysical principles to the inestigation of the earth's crust for the solution of problems in geology hrough geophysics.--W. Ayvazoglou.

(109) LA EXPLORATION GEOFÍSICA DEL SUBSUELO

(GEOPHYSICAL EXPLORATION OF THE SUBSOIL)

By Norberto Gella and Juan Brüggen

Boletin Minero, Santiago de Chile, 1930,
vol. 42, No. 377, pp. 507-521, and No. 378, pp. 599-617.

This article has been published, by the request of the Boletin Minero, owing to the great interest shown in geophysical methods of prospecting during a meeting held in August, 1930, at the Catholic University under the auspices of the "Sociedad Nacional de Mineria" (National Mining Society) in Santiago.

The article consists of two parts.

In the first part the authors discuss the relation between geology and geophysics and the application of geophysical investigation to ore deposits, coal, petroleum, subterranean water, construction of bridges and buildings.

In the second part the different geophysical methods of prospecting are discussed and it is explained how they can be applied for the exploration of the subsoil.

The following methods are mentioned: gravimetrical, seismic, magnetic, radioactive, geothermal, and electrical.

In conclusion a series of places in which the electrical methods were carried out is enumerated.

The article is illustrated by 32 figures and supplied with bibliography.--W. Ayvazoglou.

(110) LAS PRIMERAS EXPLORACIONES GEOFISICAS CON SISMOGRAFAS Y BALANZA DE TORSION EN LA REPUBLICA ARGENTINA

(FIRST GEOPHYSICAL PROSPECTING CARRIED OUT BY SEISMOGRAPHS AND TORSION BALANCE IN THE REPUBLIC OF ARGENTINA)

By Enrique Fossa-Mancini

Boletin de informaciones petroliferas yacimientos e industrias,
vol. 7, No. 75, 1930, pp. 1007-1024.

In one of his previous articles, "Possible applications of geophysical methods of prospecting for petroleum in the Republic of Argentina" (Bola. Inf. Pet. Yacim. Ind., vol. 6, No. 55, 1929, pp. 207-237), the author examined the general principles of different geophysical methods of prospecting (gravimetrical, magnetic, seismic, acoustical, electrical, electromagnetic, radioactive, and geothermal) and the possibility of their application in the region of the Gulf of San Jorge.

In this article Fossa-Mancini discusses the possibility of prospectng in Argentina for petroleum by seismograph and torsion balance.

Figures showing the structural conditions in some places in the nited States (Kansas, Mexico, Texas, etc.) and those in Argentina (Campo uran) are given for comparison. The conclusion is drawn that the good reults obtained by preliminary investigation have proved that geophysical ethods should be tried out on a larger scale in the region of the Gulf of an Jorge.--W. Ayvazoglou.

(111) PRACTICAL ASPECTS OF GEOPHYSICAL SURVEYS

By J. J. Jakosky

The Mining Journal, Arizona, vol. 14, No. 16, 1931, pp. 7-9 and 29.

Jakosky's paper deals briefly with the general economic consideraions relative to the application of geophysics. A few examples are given o show the general diversity of information possible from a geophysical urvey.

The following main subjects are discussed: The prospector and odern science; the effects of curtailment on geophysics; the use of geohysics (determination of areas where commercial mineralization may exist and orking out of structural problems); geophysics and geology; processes and ield procedure; cost of geophysical work; chances of success without appliation of geophysics; illustrations of the applications of geophysics; irriation and water supply problem; river channels and placer deposits; and oil tructures.--W. Ayvazoglou.

(112) SULLE CARATTERISTICHE FISICHE DELLA PIANURA MARGINALE APPENNINICA MODENESE

(ON PHYSICAL CHARACTERISTICS OF THE APPENNINIAN BORDER PLAIN OF MODENA)

By A. Belluigi

Rendiconti della R. Accademia Nazionale dei Lincei,
vol. 11, No. 8, 1930, pp. 769-772.

The author describes the gravitational and earthmagnetic measurements arried out by him in the Appenninian border plain of Modena. From these easurements the dependence between the magnetic susceptibility and the density f deep masses has been established. The whole area was divided into sections y tracing parallel lines, 3,750 meters distant one from another and perpenicular to the magnetic meridian of Modena. The data obtained from the magetic and gravimetric measurements are given in a table; they show that the ensity of deep masses is greater than that of rocks situated close to the urface. From these data the author concluded that gypsum or similar minerals ust be deposited at a depth. This conclusion agreed with the investigations ade by Fossa-Mancini and others.--W.Ayvazoglou.

(113) GEOPHYSICAL COMPANY, LTD., LONDON

Editorial note

The Mining Magazine, London, vol. 43, No. 4, 1930, p. 234.

The amount of geophysical work done by geophysical companies during the recent years was illustrated at the fourth general assembly of the International Union of Geodesy and Geophysics held at Stockholm in August, 1930. Maps, sketches, and apparatus were exhibited at the Museum of the Swedish Geological Survey.

The exhibition included:

1. A summary of seismographical investigations carried out since 1921 in Texas, Louisiana, Mexico, Egypt, Iraq, Persia, Spain, England, Holland, Sweden, Poland, Germany, Austria, and elsewhere, showing that 100,219 seismograms had been recorded, that the total length of profiles observed was 152,566 miles, and that the total area covered by such investigations was 73,834 square miles.

2. A summary of gravimetric investigations in Texas, Louisiana, Oklahoma, New Mexico, Kansas, Pennsylvania, Missouri, Egypt, Mexico, Italy, Spain, Poland, Sweden, Germany, Austria and elsewhere, showing that over 31,095 observations had been made covering an area of more than 20,988 square miles, and also that 438 pendulum observations had been made in Germany, Egypt, Oklahoma, and Kansas, covering an area of 4,635 square miles.

3. Maps showing results of seismic and gravimetric investigations on salt domes near Celle (Germany). These maps showed seismic observation lines, torsion-balance stations with gradients and curvature values, pendulum stations with the observed relative values of gravity and the boundaries of salt domes located and outlined by such investigations.

4. Maps of Texas and Louisiana showing 119 salt domes discovered by geophysical methods since 1924 in the Gulf Coast area.

5. A list of salt domes discovered by geophysical methods in Texas and Louisiana since 1924, showing method of discovery, year discovered, and details of development.

6. Map showing that in the Gulf Coast area of Texas and Louisiana, 51,900 square miles had been investigated by the seismic method and 8,226 square miles by the gravimetric method.

7. Map showing the results of a gravimetric survey of the salt dome of Blue Ridge, Texas (a shallow dome at a depth of 400 to 500 feet with a thick cap rock of anhydrite and gypsum).

8. Map giving results of a gravimetric survey on the salt dome "Sugarland Texas (this dome has a depth of 4,200 feet).

9. Map of the results of a seismic investigation in the coal district of South Holland.

10. Map of the results of a gravimetric survey in the ore district of Menstrask, Sweden.

11. Map showing the results of a gravimetric survey carried out near Rickling, Holstein (Germany).—W. Ayvazoglou.

8. GEOLOGY

(114) ZUR FRAGE DER BESCHAFFENHEIT DES ERDINNERN

(ON THE QUESTION OF THE CONSTITUTION OF THE INTERIOR OF THE EARTH)

By H. Haalck

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 68-74.

The existing hypothesis on the division of the earth's body into three parts, (1) rocks of the earth's crust (silica envelope to 1,200 kilometers in depth), (2) intermediate layer (sulphide layer to 2,900 kilometers in depth with subdivisions to 1,700 and 2,450 kilometers in depth), and (3) the metallic nucleus (nickel-iron) can not be considered as being established on a positive basis. There are even some reasons according to which the division of the earth body into the two following parts must be considered more probable: The earth's crust (to 2,900 kilometers in depth) is represented by the three-phase system, well-known from metallurgical practice: (1) molten silica (to 1,200 kilometers in depth), molten sulphides (to 1,700 or 2,450 kilometers in depth), and (2) molten metal (to 2,900 kilometers in depth). At this depth the pressure and the temperature exceed the critical value, and the matter passes over by bounds into another very different and unknown condition. It may be possible to explain the existence of the magnetic earthfield by the condition of the matter of the nucleus of the earth.--Author's abstract translated by W. Ayvazoglou.

(115) DIE BEDEUTUNG TECHNISCHER BRUCH-FORMEN FÜR DIE ERMITTLUNG GEOPHYSIKALISCHER STÖRUNGS-BEREICHE, ERLÄUTERT AN DER ZONE DES ROTEN MEERES

(THE IMPORTANCE OF TECHNICAL FORMS OF FRACTURES FOR THE DETERMINATION OF GEOPHYSICAL DISTURBANCE AREAS ILLUSTRATED BY THE ZONE OF THE RED SEA)

By Erich Seidl

Zeitschrift fuer Geophysik, vol. 7, No. 1/2, 1931, pp. 117-127.

The importance of cooperation of geophysics with tectonic geology for obtaining geophysical measurements of greater accuracy and the possibility of better evaluation of the results are mentioned.

The explanation of geological changes in form, based on experiments with metals and rocks is discussed, and a table comparing the fractures caused by technical mechanics (technical forms) with those caused by geomechanics (geological forms) is given.

By the example of the Red Sea zone the author shows how, by using the so-called "form-key" (Formen-Schlüssel), the exact mechanical interpretation of the results of magnetic and gravitational measurements can be obtained. --W. Ayvazoglou.

9. NEW BOOKS

(116) Korzujin, Juan. Tratado de Petroleo (Treatise on petroleum). To be published by the Administracion de "Ingenieria" Calle de Tacuba No. 5, Mexico, D. F. The work will consist of four volumes: Vol. I, Geophysics, about 300 pp. Detailed description of the theory and practical application of the following methods: gravimetrical, magnetic, electrical, seismic, and radioactive will be given. Vol. II, Geology of petroleum, about 300 pp. Vol. III, Exploitation of petroleum, about 500 pp. Vol. IV, Technology of petroleum, about 300 pp. The price for the first volume is reduced to $6 to subscribers.

(117) Krejci-Graf, Karl. Grundfragen der Oelgeologie (Fundamental principles of oil geology). Stuttgart, Enke, 1930, 182 pp. Chapter 9 deals with geothermal gradient.

(118) Krumbach, G. Einführung in die Erdbebenkunde (Introduction to the science of earthquakes). (Mathematisch-naturwissenschaftlich-technische Bucherei, herausgegeben von E. Wasserloos und G. Wolff, Bd. 22), Berlin, Otto Salle, 1929, 74 pp., 39 figs. Price, R.M. 3.00. Contents: I. Processes in the epicenter of an earthquake. II. Instrumental methods of investigation. III. Seismic records (travel-time curves, determination of the epicenter, structure of the interior of the earth, disturbance of the soil, application of seismic method for investigation of the ground, earthquake service).

(119) Nippoldt, Dr. A. Verwertung magnetischer Messungen zur Mutung (Utilization of magnetic measurements for locating deposits). Berlin, Julius Springer, 1930, 74 pp., 19 figs., 36 tables. Price, R.M. 16.50. Contents: Introduction; salient pole; consequent pole; magnetic plate; application of the method; the topographic effect; elimination of the normal field.

(120) Sieberg, Prof. A. Handbuch der Geophysik (Handbook of Geophysics). Berlin, Gebruder Borntrager, , vol. 4, pt. 2, 388 pp., illustrated. Price, R.M. 30.

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1. GRAVITATIONAL METHODS

(121) IMPROVED METHODS IN GRAVITY DETERMINATIONS

By A. C. Longden

Transactions of the Illinois State Academy of Science,
vol. 22, 1930, pp. 339-348.

After a brief discussion of generally used methods of the absolute determination of gravity by means of a pendulum, the author describes his new method by which some defects of the old methods, with regard to accuracy of measurements, can be avoided.

Both simple pendulums and compound reversible pendulums may be used in the improved method, in which the length of a pendulum is compared with that of a carefully prepared invar rod. The method is explained in detail. Illustrations of the apparatus are given.

At the end of the article Longden observes that although knife edges were assumed in the description of his pendulum, actually he was using well-hardened, highly polished steel rollers 3 or 4 millimeters in diameter. The preference for roller bearings in place of knife edges is explained.

In conclusion, the author says that in order that the length of pendulum shall remain constant the rods should have an extremely low coefficient of linear expansion. For this reason invar, nickel-steel alloy which expands only about one part in a million for a change of temperature of 1°, is used; but invar is strongly magnetic, and the pull of the earth as a magnet is added to the earth's gravitational pull in the pendulum.

To avoid this complication the author recommends the use of fused quartz, which has an even lower coefficient of expansion than invar and is entirely free from magnetic effect. In lieu of fused quartz, well-selected pyrex tubes give very satisfactory results.

The methods described in this paper relate to absolute determinations of gravity and not to the relative work carried out with the half-second pendulums.--W. Ayvazoglou.

(122) ISOSTASY AND THE FIGURE OF THE EARTH

By W. Heiskanen

American Journal of Science, vol. 21, No. 121, 1931, pp. 39-50.

In this article Heiskanen discusses Hopfner's opinions on isostasy and the figure of the earth expressed in the form of the following statements:

1. Helmert's, Berroth's and Heiskanen's triaxial ellipsoids are due solely to the isostatic method of reduction and thus have no real relation to the facts of the case.

2. Because in isostatic reductions the displacement of mass takes place, hich in turn causes warping of the geoid, the isostatic reduction can not be sed in determining the figure of the earth.

3. The observed gravity anomalies can be explained solely by means of the arping of the geoid (Bruns's term) without the principle of isostasy.

4. The elevation and depression of the geoid referred to the spheroid are astly greater than hitherto has been supposed.

5. The existence of isostatic compensation is at least questionable.

Heiskanen considers in detail in this article the reduction of gravity bservations and the significance of the gravity formulas derived from reduced ravity values, thus trying to prove that Hopfner's arguments are incorrect.

A list of references is added.--W. Ayvazoglou.

(123) PROFESSOR P. M. NIKIFOROV'S FORMULAS FOR CONSIDERATION OF THE INFLUENCE OF THE TOPOGRAPHIC RELIEF UPON TORSION-BALANCE MEASUREMENTS (IN RUSSIAN)

By N. Samsonov

Bulletin of the Geological and Prospecting Service, U.S.S.R., Leningrad, vol. 49, No. 6, 1930, pp. 67-70.

In this article the author gives a critical estimation of formulas oncerning calculation of the correction for topographic relief, as proposed by ome scientists (Eötvös, Schweidar, Nikiforov, Numerov, Haalck, and others). rom examination of Nikiforov's formulas Samsonow draws the following concluions:

1. Nikiforov assumes that for values of $\rho \geqslant 20$ m. the expression $\left(\frac{c-x}{\rho}\right)^2$ s small; Eötvös admits this simplification only for $\rho \geqslant 100$ m.

2. The condition $\rho \geqslant 20$ m. is not taken into consideration, and numerical oefficients are given for $\rho \geqslant 4$ m.; this causes an error up to 45 per cent n calculations of the correction.

3. Nikiforov does not make a difference between the curve of the relief Z ρ) and the expression $f[\rho, Z(\rho)]$ under the integral sign, therefore he erronously considers the relief-curve Z (ρ) as a curve of the second order.

4. In the derivation of the formulas Nikiforov assumed that a relief up to 0 m. can be considered an inclined plane; this is not possible in practice.

Nikiforov's method is, in the opinion of the author, a step backward f compared with Eötvös's formulas; therefore, owing to the errors admitted, it an not have either theoretical or practical importance.--W. Ayvazoglou.

(124) GRAVIMETRIC AND SEISMIC EXPEDITION TO CENTRAL ASIA

By D. Mushketov and P. Nikiforov

Comptes Rendus de l'Académie des Sciences de l'U.S.S.R., Leningrad,
No. 22, 1929, pp. 499-502.

In this article the authors describe the gravimetric and seismic expedition to Ferghana (Central Asia) in the autumn of 1928. Ferghana, a province of most intensive seismic activity, is known for quite exceptional (as to numer values) negative anomalies of intensity of the force of gravity (up to 0.358 cm sec.^{2}), as well as for considerable anomalies in its direction. That region is also known for its tectonic phenomena, which have resulted in strongly develope folds, faults, thrusts, and overthrusts. Thus the extensive study of this region would have exceptional scientific and practical value.

The expedition consisted of three parties, working with pendulums, torsion balances, and seismographs, respectively.

In this article the authors give only the results of the study of pen lum observations. In a table, two columns (8 and 9) contain the theoretical values of gravity at the stations named in column 1, as computed from Helmert's formula corrected for elevation (γ) and for topography and compensation (γ_1), according to Hayford's formulas.

The observed values of g are given in column 10 and in columns 11 and 12 the free air ($\Delta g = g - \gamma$) and Hayford's ($\Delta g_1 = g - \gamma_1$) anomalies, respectively, are given.

Both anomalies Δg and Δg_1 have a very smooth and consequent course, reaching the maximum of absolute value in the center of the Ferghana Valley, the extreme values being very high, namely: $\Delta g = -0.197$ and $\Delta g_1 = -0.112$ cm./ sec^2.

Both anomalies are negative on the whole stretch, save for Δg_1 at Shakhimardan. In the north, at the entrance into flat steppes, g is approaching its normal value. The authors conclude: "Thus, in the area of the Ferghan depression, a lack of compensation is established quite positively, which involves the tendency of that portion of the earth crust to vertical displacemen upward, the latter circumstance being the cause of numerous strong earthquakes. As to the origin of the Ferghana depression we are led to conclude that it was formed as the result of squeezing of the earth crust, the sial-masses being pressed into a denser layer underlying the crust."--W. Ayvazoglou.

C. 6478

(125) DIE BESTIMMUNG DER GEOIDUNDULATIONEN AUS SCHWEREMESSUNGEN.

(DETERMINATION OF GEOID UNDULATIONS FROM GRAVITY MEASUREMENTS)

By Karl Jung

Gerlands Beiträge zur Geophysik, vol. 29, No. 1, 1930, pp. 29-64.

According to discussions published previously in this journal the ostatic gravity anomalies can not be used directly for determination of the oid undulations, as the moving of masses on which the reduction is based uses displacement of the potential surface.

Two methods are developed to avoid this inconvenience. The effect the isostatic reduction upon the position of the potential surface is cal-lated and represented in a series of spherical harmonics. The negative re-lt of this potential surface displacement (called "Isostatische Geoidundula-on"), "U", represents undulation of the geoid in case of purely isostatic ructure of the earth's crust. "U" and correction $K^{(is)}$, which must be added the result if the isostatic anomalies are applied directly, are calculated using spherical harmonics of the first 5°; maps representing them are added.

The method given by Hopfner in this journal does not result in the oid undulations sought but in undulations for a potential surface, which in-ludes all masses on which gravity has the same distribution as on the real oid.

A correction must be added on account of the masses lying outside the geoid. This correction, $K^{(H)}$, is also calculated by using spherical rmonics of the first 5°; maps are added.

It is evident that the calculations carried out up to the fifth de-ee show only the magnitude and the distribution in general. From compari-n of the maps it can be seen that the correction by using Hopfner's method s a value 4 to 5 times as great as the correction obtained from the direct plication of the isostatic anomalies. Therefore it would be better, even thout making corrections, to use the gravity values reduced isostatically.

The corrections must not be neglected, as the undulations which can expected are smaller and have about the value of the isostatic undulation ".

By inserting the isostatic undulation in the "Bruns's term" the sitive isostatic anomaly found by Vening Meinesz on the oceans may be re-ced or even may disappear altogether.

It is shown that in consequence of the isostatic reduction only out 1/13 to 1/30 of the ellipticity of the parallels, as determined by Hel-rt, Berroth, and Heiskanan, can be explained.--Author's abstract translated W. Ayvazoglou.

This article is followed by brief notes written by Hopfner and Jung which the authors defend their points of view on the question.

2. MAGNETIC METHODS

(126) DIE ERDMAGNETISCHEN BEOBACHTUNGEN DR. W. FILCHNERS AUF SEINER GROSSEN REISE IN CENTRALASIEN IN DEN JAHREN 1926-1928.

(EARTH-MAGNETIC OBSERVATIONS BY DR. W. FILCHNER DURING HIS LONG JOURNEY IN CENTRAL ASIA IN 1926-1928)

By O. Venske

Meteorologische Zeitschrift, vol. 47, No. 11, 1930, pp. 452-453.

In this article Venske reports on the earth-magnetic observations by Dr. W. Filchner during his journey through China and Tibet in 1926-1928.

The material of observations brought back by Filchner is very rich. Eight hundred fifty-eight measurements were made at 145 stations. The number of measurements is almost equally distributed among the earth-magnetic elements (declination, horizontal intensity, and inclination). The observations have proved to be reliable and very useful; they form a valuable material for correction and completion of the existing earth-magnetic maps.--W. Ayvazoglou.

(127) ERGEBNISSE DER ERDMAGNETISCHEN BEOBACHTUNGEN IN SEDDIN IN JAHRE 1929

(RESULTS OF EARTH-MAGNETIC OBSERVATIONS IN SEDDIN IN THE YEAR 1929)

By A. Nippoldt

Meteorologische Zeitschrift, vol. 47, No. 12, 1930, pp. 487-488.

Magnetic observations in Potsdam have been discontinued since 1928, owing to disturbances caused by electrification of the surrounding railway lines. All the measurements will be registered during one year in Seddin, parallel to those in the new observatory in Niemegk. The mounting of variometers in Niemegk was started on August 1, 1930. A table is added showing the monthly and yearly mean values of the magnetic elements for Potsdam and Seddin.

According to the data given the connection between the magnetic activity and the number of sun spots can be established only in general. This connection may be proved by examining the relative figures of the days of disturbance. It has been established that the intensity of the disturbance does not correspond to the size of the spots and that large number of spots may appear without causing great magnetic disturbance.--W. Ayvazoglou.

(128) A MAGNETIC METHOD OF ESTIMATING THE HEIGHT OF SOME BURIED MAGNETIC BODIES

By A. S. Eve

American Institute of Mining and Metallurgical Engineers,
Technical Publication 408, 1931, 8 pp.

The author describes tests at the Falconbridge mine as to the ossibility of estimating the depth to which the pyrrhotite-nickel deposit xtended in the earth.

A suggestion was made by Dr. F. W. Lee that this problem might be olved by measuring the vertical magnetic intensity with a good magnetometer, oth near the surface of the earth and also at a level a few feet higher in he air. A light wooden platform was made measuring 4 by 4 feet on the top nd 10 feet above ground, and readings were taken along a traverse at right ngles to the ore body, as well as over a straight magnetic diabase dike, both n the ground and on the platform. According to these readings (given in a able) the magnetic vertical intensity is consistently less at the higher evel, which is 10 feet above the lower level. After some mathematical calcuations the author concludes that the difference in the readings due to so mall a height as 10 feet makes the calculated vertical extent of the dike a ighly uncertain quantity, and it is probable that in many cases it may be ecessary to have a wooden tower with platforms at 10, 20, and 30 feet above he ground. This seems an elaborate measure, but its cost is trifling compared ith drilling, if accurate data can be obtained.--W. Ayvazoglou.

(129) A METHOD FOR DETERMINING MAGNETIC SUSCEPTIBILITY OF CORE SAMPLES

By William M. Barret

American Institute of Mining and Metallurgical Engineers,
Technical Publication 394, 1931, 20 pp.

The present method was developed to meet the need for routine analysis f specimens in the geomagnetic laboratory, where it was felt that general tility, ruggedness, ease of manipulation, and reproducibility of results had reater importance than extreme sensitivity.

After discussion of various methods (1, Null method, inductive balnce; 2, null method, current balance; 3, seminull method; 4, deflection method, losed circuit; 5, deflection method, open circuit, the author concludes that he utility and accuracy of these methods will depend upon the following:

1. Quality of the equipment.
2. Precise calibration of the component parts of the apparatus.
3. Exact determination of the instrumental constants of the composite arrangement.
4. Manipulative technique of the operator.

A mathematical treatment of the theory and calibration for each method f operation is included. The discussion of the apparatus is accompanied by hotographs and performance curves.--W. Ayvazoglou.

3. SEISMIC METHODS

(130) REPORT ON THE ACTIVITY OF THE EARTHQUAKE RESEARCH INSTITUTE, TOKYO IMPERIAL UNIVERSITY, IN THE FIRST HALF OF 1930.

By Chuji Tsuboi

Gerlands Beiträge zur Geophysik, vol. 28, No. 1-3, 1930, pp. 355-362.

This is the third report published by Tsuboi on the activity of the Earthquake Research Institute in Tokyo (for previous reports see Geophys. Abstracts 10 and 16); it consists of a brief summary of the field and laboratory investigations in the first half of 1930.

Itō earthquakes. The unusual seismic activity during the first half of 1930 caused great interest, and the results of investigations made in connection with this activity are enumerated.

Experimental. (1) R. Takahashi completed construction of a long vertical pendulum seismograph suggested by Prof. H. Nagaoka. The reason for preferring the use of the vertical pendulum is explained. A photograph of the lower part of this seismograph is added. (2) Observations with the Ishimoto tiltometer of the tilting of the surface of the ground have been made in many stations. The results are mentioned. (3) A series of model experiments on the collapse of wooden houses caused by earthquake motions was made by K. Suyehiro.

Geophysical. (1) T. Terada developed a discussion on the nature of destructive earthquakes. He emphasized the desirability of distributing a specially designed seismoscope over the country and of measuring the microscopic gross effects of destruction so as to enable further study of the correlation of their distributions with the seismotectonic structure of the district concerned. (2) C. Tsuboi continued to study deformation of the earth's crust in the Tango district connected with the Tango earthquake of 1927.

Mathematical. (1) K. Sezawa studied free oscillation of an elastic surface layer of a finite thickness which covers a semi-infinite elastic solid. (2) K. Sezawa and G. Nishimura discussed the possibility of the approximately independent movements of land blocks which were pointed out by some of the staffs of the institute actually to have appeared, especially in connection with the Tango earthquake of 1927. (3) G. Nishimura discussed the effect of temperature distribution on the deformation of a semi-infinite elastic body.--W. Ayvazoglou.

(131) BEOBACHTUNGEN ZUR PL-WELLE

(OBSERVATIONS OF THE PL-WAVE

By H. Landsberg

Gerlands Beiträge zur Geophysik, vol. 28, No. 1, 1931, pp. 64-68.

New observations of the PL-wave, discovered by O. Somville (Geophys.

bstr. 21, p.9) in diagrams produced by the earthquakes in the central parts f Italy, are given from the records obtained by the Taunus Observatory. This ave has been found also in the diagrams of other earthquakes originating in ther southern parts (Messina, Thessaly, Asia Minor) and seems to have appeared ven in the case of an Iceland quake.

The time curve, the registering of which was published by Somville, s completed by new observations and is extended as far as 2,500 kilometers.--uthor's abstract translated by W. Ayvazoglou.

(132) PROCÉDÉ GRAPHIQUE POUR DÉTERMINÉE L'EPAISSEUR DES ALLUVIONS

(GRAPHICAL METHOD FOR DETERMINING THE THICKNESS OF ALLUVIUM)

By C. Alexanian

In this pamphlet Alexanian describes a graphical method for the de-ermination of the thickness of alluvium by the seismic method. The simple olution may be of use for geologists and geophysicists.--W. Ayvazoglou.

(133) GEOPHYSICAL PROSPECT DEFINITELY PROVED

By Neil Williams

Oil and Gas Journal, vol. 29, No. 38, 1931, p. 44.

The Iowa geophysical prospect of the Calcasieu-Jefferson Davis arish line, southern Louisiana, was definitely proved as another Gulf coast ield. This is the first test drilled on this prospect which was carried out y seismograph exploration in 1929.--W. Ayvazoglou.

(134) PROVE ANOTHER GEOPHYSICAL PROSPECT

By Neil Williams

Oil and Gas Journal, vol. 29, No. 39, 1931, p. 50.

Test in Plaquemines Parish, extreme southeastern tip of Louisiana, as proved another geophysical dome. It is in a cavity in what is believed to e cap rock at 2,216 feet. This dome was located by seismograph during 1928. eophysical findings during 1928 had indicated that dome material, cap rock or alt, would be found between 2,000 and 2,500 feet.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(135) MEASUREMENTS OF RESISTIVITY BY CENTRAL ELECTRODE METHOD AT ABANA MINE, NORTHWESTERN QUEBEC, CANADA

By Lachlan Gilchrist

American Institute of Mining and Metallurgical Engineers,
Technical Publication 386, 1931, 17 pp.

At the Abana mine, northwestern Quebec, there is a porphyritic quartz diabase dike about 225 feet wide and extending north-south; the location has been determined in general outline by means of a dip needle or magnetometer.

This dike has an overburden of glacial drift 75 to 200 feet thick. Adjacent to the dike on the western side is an ore body of pyrite and chalcopyrite and sphalerite of low resistivity and on the eastern side is another ore body of considerably higher resistivity. A central-current electrode was placed at points above the dike, and end-current electrodes were placed at points about 1,000 feet east and 1,000 feet west of the central electrode. Electrodes for potential measurements were placed 50 feet apart along lines running north and south through the central-current electrode stations.

With this layout measurements of resistivity at successive distances from the central electrodes were made. From interpretation of the results an approximate determination of the depth of the overburden and a fairly accurate determination of the location of the ore bodies could be made.--Abstract reprinted from Mining and Metallurgy, vol. 12, No. 20, February, 1931.

(136) MATHEMATICAL THEORY OF ELECTRICAL FLOW IN STRATIFIED MEDIA WITH HORIZONTAL, HOMOGENEOUS, AND ISOTROPIC LAYERS

By D. O. Ehrenburg and R. J. Watson

American Institute of Mining and Metallurgical Engineers,
Technical Publication 400, 1931, 18 pp.

Making use of a generalized method of images the authors have obtaine a solution for the electrical flow in a stratified medium with horizontal, homogeneous, and isotropic layers. This solution can be used for any number of layers of any thickness and of any resistivity. Theoretically, the generalized method of images is applicable to any number of layers. However, in practice it will be found that in the case of a more than 3-layer earth this method becomes quite awkward. The method presented here is analytical, although certain principles of the image theory are utilized indirectly in building the tentative solution. The differential equations finally lead to a set of algebraic equations; these result in formulas which can be arranged in a rather simple form, so that particular solutions for arbitrary cases may be built up and carried out numerically by one unfamiliar with both the methods of images and the calculus. Six calculated curves are included which show the percentage anomaly of resistivity for a 2-layer, 3-layer, and 4-layer earth using fixed-current electrodes and moving-potential electrodes.--Abstract reprinted from Mining and Metallurgy, vol. 12, No. 290, 1931.

(137) ELECTRICAL EXPLORATION APPLIED TO GEOLOGICAL PROBLEMS IN CIVIL ENGINEERING

By E. G. Leonardon

American Institute of Mining and Metallurgical Engineers,
Technical Publication 407, 1931, 17 pp.

In this paper Leonardon describes the practical results obtained in everal problems of civil engineering by resistivity measurements of the underround. The theoretical and technical sides of the process employed are not iscussed, and only a few general points are mentioned to make clear the pracical examples given.

The practical examples discussed are the following:

1. Exploration at Bridge River Tunnel.
2. Exploration on the St. Lawrence River near Morrisbury, Ontario, Canada.
3. Survey on the Lièvre River near Masson, Quebec, Canada.

From these practical examples (illustrated by figures) the author hows how the resistivity measurements of the underground can supplement efficaciously the geological information in the study of certain engineering proects.

The advantages of the electrical method for carrying out structural tudies are its rapidity and economy, which makes it particularly valuable in reliminary surveys where a general outline of the underground conditions is equired immediately.

The author demonstrates the rapidity and economy of the process by he following figures: The survey at Bridge River required only four working ays; the works at Morrisbury and Masson were performed in 30 and 33 1/2 working days respectively. During the course of these last two explorations, 176 epth determinations were made, which cost the companies about $10,000.

A close cooperation between the geologist and geophysicist is reuired for obtaining the most complete and satisfactory results.--W. Ayvazoglou.

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(138) ELEKTRISCHE BOHRKERNBESTIMMUNG

(ELECTRICAL DETERMINATION OF CORES)

By C. and M. Schlumberger

Internationale Zeitschrift fuer Bohrtechnik, Erdölbergbau, und Geologie,
vol. 38, No. 1, 1930, pp. 1-8.

This is a translation of the lecture delivered by C. Schlumberger at he Second International Drilling Congress in Paris. The article was published in Mining and Metallurgy, vol. 10, No. 275, 1929, pp. 515-518 under the title, "Electrical Log and Correlations in Drill Holes." (See Geophys. Abstr. 20, Dec., 1930, pp. 14-15).--W. Ayvazoglou.

5. RADIOACTIVE METHODS

(139) COMPARISON OF SCHWEIDLER'S TWO METHODS FOR DETERMINING AVERAGE LIFE OF SMALL IONS IN AIR

By Cilian O'Brolchain

Gerlands Beiträge zur Geophysik, vol. 29, No. 1, 1931, pp. 1-21.

Contents of the article:

Part I Introduction.

Part II Description of Schweidler's methods I and II.

Part III Description of apparatus and experimental details.

Part IV Results (the results of the 33 experiments made are shown in a table).

The following summary is given by the author:

The two methods proposed by Prof. Schweidler for the determination of β', the diminution constant of small ions in the presence of nuclei and large ions (and the reciprocal of β' i.e., ϑ, the average life of the small ions) are discussed. The correction for diffusion in method I is shown to be important.

The investigation of the values given by the two methods when applied to the same air is described. It is found that the values differ considerably. The value of the ratio β'_{II} / β'_{I} is always greater than unity, where β'_{II} and β'_{I} denote the values of β' obtained by methods II and I respectively. The mean value of this ratio is about 2.

There are considerable variations in the value of the ratio obtained in different experiments. No dependence of the value of the ratio on the absolute value of β'_{II} or of β'_{I} could be found. Likewise, no dependence could be found on the value of q, the rate of production of ions in the ionization chamber.

The mean value of the ratio n_+/n_-, where n_+ and n_- denote the number of positive and negative small ions per cubic centimeter in the air of the ionization chamber, was found to be 1.30.--W. Ayvazoglou.

(140) THE NATURE AND MOBILITY OF AIR IONS (IN RUSSIAN)

By Z. F. Valta

Journal of Geophysics and Meteorology, Leningrad,
vol. 6, No. 3, 1929, pp. 195-215.

In the first part of the article the author gives a concise exposi-ion of the results of the investigations on the nature and the mobility of ons made by a series of scientists. Values for the mobility of ions and urves showing their mobility under various conditions are given.

The second part deals with the new methods of determination of the obility, the idea of which belongs to W. J. Altberg, but some essential im-rovements were added by the author in constructing the apparatus.

A picture of the apparatus, which consists of a cylindrical condensa-or of Zeleny's type, and a detailed description thereof are given.

The advantages of the apparatus improved by the author as compared ith that constructed by Zeleny are summarized as follows:

1. There is a possibility of measuring young ions, up to 10^{-4} seconds of age.
2. The place of ionization is strictly determined.
3. The field inside of the condenser remains homogeneous.
4. The distribution of ions is not distorted.
5. All the data necessary for the determination of the mobility are easily determined.

The dependence of the mobility of positive ions on their age has een measured with the aid of this apparatus, and curves have been drawn show-ng the smaller the age of the ions the greater their mobility. By drying the ir current which passes through the apparatus by means of calcium chloride $(CaCl_2)$ or phosphoric anhydride (P_2O_3), and by freezing it by means of liquid ir, increased values of mobility were obtained.--W. Ayvazoglou.

6. GEOTHERMAL METHODS

(141) GEOTHERMAL PHENOMENA AND GEOLOGICAL HISTORY WITH SPECIAL REFERENCE TO OLD STRUCTURES IN GEOTHERMAL EQUILIBRIUM

By M. W. Strong

Journal of the Institution of Petroleum Technologists,
vol. 16, No. 86, 1930, pp. 889-901.

Geothermal phenomena are discussed in this article under the follow-ing headings:

1. Introduction. Thermal conditions to be expected in old structures are considered first. Investigation is continuing with reference to these conditions in young structures where thermal changes may be expected to be still continuing.

2. Some factors affecting geothermal distribution. The conductivity of the rocks and of their fluid contents are the dominant factors determining the thermal conditions. Topographic irregularities must also be taken into consideration. Effects due to the underground movement of water, oil, and gas must be analyzed specifically in each case in which they arise.

3. Conductivities of rocks. Approximate conductivity of various rocks and substances is given.

4. Influence of thermal conductivity on strata on isogeotherms. The distribution of heat in and around masses of relatively good and bad thermal conductivity placed in a medium through which heat is flowing is examined by the aid of some diagrams.

5. Buried hills or anticlinal structures. These are considered on the supposition in each instance that the structure is old enough for geothermal equilibrium to have been attained.

6. Faults and unconformities. The distribution of isogeotherms in the neighborhood of a fault which has thrown badly conducting strata against strata of higher conductivity is considered.

7. Buried faults and unconformities. The thermal distribution above a buried fault by which beds of different conductivities have been brought into contact, the whole lying buried beneath a thick overburden, is considered.

8. Importance of conductivity determination. Determination of the conductivities of the beds should be one of the first objectives of a geothermal survey, as they are the controlling factors determining the geothermal distribution.

9. Note on topography and isogeotherms. The static distribution of temperature under hills is illustrated in a figure. It is shown by the diagrams that in homogeneous horizontal strata topographic irregularities alone would give rise to irregularities of the isothermal contours.

10. Factor for elevation with respect to sea level. The necessity of measuring the mean surface temperature is mentioned.

11. Influence of dip on conductivity. In some sandstones, especially if micaceous, and in slates and some laminated shales, the conductivity perpendicular to the cleavage may be only about half that parallel to the cleavage, so that in some districts allowance must be made for this additional factor.

12. Some general remarks on static thermal fields are given.

13. Presentation of geothermal data. It is evident that for the elucidation of geothermal data the data must be presented in the form of isogeotherms.

drawn on a geological section, together with information regarding the lithology of the several beds.

14. Gradients and their significance. Wide variations in the values of gradients assembled from temperature measurements in boreholes show the necessity of studying their significance.

15. Applications of geothermal methods to the study of old structures. Detailed application of diagrams showing the kinds of thermal fields to be expected must be worked out in each district separately, having regard to local structural and lithological conditions, and no general rules can be given for their use.

The author concludes that with regard to locating oil sands in a given structure by means of temperature there are at present insufficient data on the conductivity of oil-bearing beds in comparison with the conductivity of the same beds when water logged or barren, and until these experimental data come to hand geothermal data must be regarded as of use only in so far as they are indicative of structure.--W. Ayvazoglou.

(142) GEOTHERMIC GRADIENTS

By J. G. Finlay

South African Mining and Engineering Journal,
vol. 41, Part II, No. 2051, 1931, pp. 509-510.

The following brief description of Dr. Haldane's "Calorometer" suggested for obtaining a standardized method of measuring rock temperatures is given:

> The calorometer consists essentially of a brass tube about 1 inch in diameter, containing a glass tube about half-inch in diameter. The space between the glass and brass tubes is packed with dry felt, and the bottom and top of the tube is secured as shown in the sketch. The glass tube is filled with distilled water, a rubber plug is inserted, and the apparatus closed by means of a brass cap. The calorometer is then placed in a bore hole and kept there for say 18 to 24 hours, when it is quickly withdrawn, unscrewed, and the temperature of the water taken.

An average of over several hundred observations in Europe and America gives what may be called a normal geothermic of approximately 1° F. per 72 feet descent.

Great departures from this normal figure (Comstock Lode in Nevada, 1° F. for every 33 feet descent; Lake Superior copper mines, 1° F. per 250 feet descent) led to the conclusion that the geothermic gradient is influenced mainly by the following factors:

(a) Lithological character of strata. According to investigations by Dr. Pirow it was found that the temperature gradient was steeper in the shales than in the quartzites and that, generally speaking, the gradient was approximately proportional to the mean conductivity of the rocks. The following table shows conductivity, as given in the British Association Report:

Rock	Conductivity, calories/cm. per sec.
Granite	0.0055
Basalt	.0055
Quartzites	.0095
Slate	.0030
Shales	.0020
Gneiss	.0051

(b) Active chemical processes of decomposition. Under such circumstances the gradient tends to become steeper.

(c) Relief of strata. It has been demonstrated on several occasions that when observations are taken on high ridges and mountains the gradient is much flatter.

(d) Presence of large bodies of cool water, adjacent to the strata. This factor serves to demonstrate the cooling effect of a large body of water (5 miles from the Lake Superior copper mines the gradient is 1° F. per 95 feet; close to the lake, only 1° F. per 250 feet).

The author concludes that in any part where observations are taken there are many conflicting factors which have to be considered, and the difficulties attendant on arriving at any definite conclusions will be obvious.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(143) NEUNTE TAGUNG DER DEUTSCHEN GEOPHYSIKALISCHEN GESELLSCHAFT

(NINTH SESSION OF THE GERMAN GEOPHYSICAL UNION)

By A. Nippoldt

Die Naturwissenschaften, vol. 18, No. 43, 1930, pp. 893-894.

This session was held in Potsdam from September 11 to 14, 1930. The session was characterized by a series of lectures concerning the relation of geophysics to other sciences. A brief account of the following lectures is given:

1. On the examination of Störmer's theory of the sun corona, according to investigations made by E. v.d. Pahlen and A. Kohlschütter, delivered by A. Nippoldt.

2. On the close connection between earth-magnetic disturbances and disturbances in radio-telegraphy reception, by Dr. Mögel.

3. On the present conditions of investigations upon penetrating radiation öhenstrahlung), by W. Kohlhörster.

4. On the researches concerning lightning phenomenon based on observations ade in various places, by Dr. A. Mathias.

5. On the seismic investigations on the Pasterze glacier, by Dr. Mothes d Dr. Brockamp.

6. On seismic investigations by explosions, by Dr. G. Angenheister.

7. On the theory of globular waves, by K. Uller.

8. On the cooperation of geology and geophysics, by R. Schwinner.

9. On the application of technical rupture experiments to geology, by Seidel.

10. On the sidereal-day variation of the earth magnetism, by Ad. Schmidt.

11. On the investigation of heavy ions in the atmosphere, by H. Israel.

12. New instruments for pendulum measurements, invented by and introduced O. Meisser, H. Martin, and Th. Gengler.

13. New instruments for statical measurement of earth-gravity, invented by Hecker and H. Haalck and explained by them.

14. Dependence of the gravitational effect on the intermediate layers, by Schlomka.

All the lectures were followed by discussion.--W. Ayvazoglou.

(144) GEOPHYSICAL INVESTIGATIONS FOR THE NORTHERN TRANSVAAL (MESSINA) COPPER EXPLORATION CO.

Editorial note

Mining and Industrial Magazine of Southern Africa,
vol. 11, No. 9, 1930, p. 353.

At the annual general meeting of this company the chairman referred the importance of geophysical prospecting and intimated that the results tained on the property of the company after many months of investigation ere highly successful and point to the location of several large mineral-earing zones of copper ore.--W. Ayvazoglou.

(145) GEOPHYSICAL EXPERIMENTAL SURVEY

Editorial note

Industrial Australian and Mining Standard,
vol. 84, No. 2173, 1931, p. 434.

The brief report of the confirmatory work of the States Departments on the geophysical experimental survey carried out during two years and completed in 1930 notices the following results:

In Queensland three bores put down at Mungana have resulted in the location of one probably small low-grade copper-bearing deposit.

In Victoria, where most of the work done was carried out by gravitational methods, forecasts of the section concerned in regard to delineation of the extent underground of a brown-coal deposit at Gelliondale have been fully confirmed by five critical bores.

In Tasmania the existence of two previously unknown copper-nickel lodes has been fully proved by costeaning; the precise position of a continuation of a pyrrhotite lode in the Renison Bell district has also been confirmed by three bores.

In South Australia a previously unknown deposit of graphite has been proved by means of a drive put out from an existing shaft.

The full report will be published by the Cambridge University Press and probably will be available early in 1931.--W. Ayvazoglou.

(146) GEOPHYSICAL PROSPECTING RESULTS IN TASMANIA AND SOUTH AUSTRALIA

Editorial note

Chemical Engineering and Mining Review,
vol. 23, No. 267, p. 101, Dec. 5, 1930.

In this article a brief report on the results of geophysical exploration by the Imperial Geophysical Experimental survey is given. Methods used for exploration are not mentioned. Several favorable zones and areas were indicated in both Tasmania and South Australia.--W. Ayvazoglou.

9. NEW BOOKS

47) Bartels, J. Geophysikalischer Nachweis von Veränderungen der Sonnenstrahlung (Geophysical indication on the changes of the sunshine rays). Special reprint from volume 9 of the "Ergebnisse der exakten Naturwissenschaften," issued by "Naturwissenschaften." Julius Springer, Berlin, 1930. The price of the complete volume, R.M. 28; bound, R.M. 29.40. Deals with the connection of meteorological and earth-magnetic phenomena with the solar variations.

48) Meteorological Office, London. The Meteorological Glossary, 1930. 233 pages. The book can be obtained from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2. Price, 4 s. 6 d. The book contains an appendix in which a translation of more than 300 technical expressions into Danish, Dutch, French, German, Italian, Norwegian, Portugese, Spanish, and Swedish is given.

49) Physics of the Earth -- II. The Figure of the Earth. Bulletin of the National Research Council, February, 1931, No. 78. 286 p. Cloth $3.50; paper $3.00. Published by the National Research Council of the National Academy of Sciences, Washington, D. C. This is a collection of short papers, written by leading scientific men in several branches of geophysics, and treating on the size and shape of the earth. Contents of the book:

Tides, Ocean and Earth.

Chapter I, Introduction. G. T. Rude, pp. 3-18, 5 figures.

Chapter II, Tidal theory. A. T. Doodson, pp. 19-39; 4 figures.

Chapter III, Tidal computations and predictions. Paul Schureman, pp. 40-49.

Chapter IV, Mean sea level. H. A. Marmer, pp. 50-67; 6 figures.

Chapter V, Earth tides. W. D. Lambert; pp. 68-80.

Chapter VI, Tidal friction. W. D. Lambert, pp. 81-99; 3 figures.

Gravity, Deflection of the Vertical, and Isostasy.

Chapter VII, Isostasy. William Bowie, pp. 103-115.

Chapter VIII, The influence of isostasy on geological thought. Harry Fielding Reid; pp. 116-122.

Chapter IX, The shape and size of the earth. W. D. Lambert, pp. 123-150; one figure.

Chapter X, Determination of "g" by means of the free-swinging pendulum. C. H. Swick, pp. 151-166; 2 figures.

Chapter XI, Gravity measurements with the Eötvös torsion balance. Donald C. Barton, pp. 167-190; 3 figures.

Chapter XII, Geodetic instruments. D. L. Parkhurst, pp. 191-200.

Chapter XIII, On some of the greater problems of physical geology, Clarence L. Dutton, pp. 201-211.

Chapter XIV, The determination of elevations. H. G. Avers, pp. 212-220

Chapter XV, The determination of geographic positions. C. V. Hodgson, pp. 221-242; 8 figures.

Variation of Latitude.

Chapter XVI, The variation of latitude. W. D. Lambert, Frank Schlesinger, E. W. Brown, pp. 245-277; 9 figures.

Index, pp. 279-286.

Each chapter is supplied with references. In the foreword of this book the necessity is mentioned of preparing a series of bulletins on the physics of the earth, the purpose being to give to the reader, presumably a scientist but not a specialist in the subject, an idea of its present status together with a forward-looking summary of its outstanding problems.

The volumes will appear serially in the bulletin series of the National Research Council, with no particular regard to sequence, each volume being issued when ready.

10. PATENTS

1. GRAVITATIONAL METHODS

(150) METHOD AND APPARATUS FOR DETERMINING GRAVITY VARIATIONS

Harvey C. Hayes,
of Washington, District of Columbia.

1,787,536 Patented Jan. 6, 1931.

This invention has particular reference to determination of the variations in the gravity constant in its relation to geophysical exploration work.

The present invention contemplates a new and improved method which overcomes to a large extent the objectionable feature of the previously known methods and apparatus. The patent discloses the use of a plurality of simple pendulums to be set up at a series of points over an area to be explored and to be operated simultaneously, with provisions for forming a common photographic record of the number of oscillations of all of the pendulums.

Claims allowed - 12.

(151) APPARATUS FOR TAKING GEOPHYSICAL MEASUREMENTS BY MEANS OF ROTATABLE BALANCE

Willy Paul Jenny, of Strasburg, Ohio, Assignor
to the firm Exploration G.m.B.H. of Hanover, Germany.

1,791,413 Patented Feb. 3, 1931.

The present invention relates to the Eötvös balances and consists of an adjustable stand for such a balance, with means for raising a base plate supporting the balance to the upmost measuring position, where the base plate is rotated automatically, and for sinking the plate afterward and rotating it automatically in one or more lower measuring stations.

Claims allowed - 3.

(152) APPARATUS FOR DETERMINING FORCE OF GRAVITY AT SEA

Harvey C. Hayes, of Washington, District of Columbia.

1,792,013 Patented Feb. 10, 1931.

The primary object of the present invention is to improve and simplify the methods now commonly employed for determination of the "gravitational constant" (g) and more specifically to provide suitable apparatus for carrying out the method at sea, and to devise a suitable gravity pendulum which will not be affected by the rolling and pitching movement of a vessel at sea.

It is proposed to eliminate the necessity for an accurate chronometer by the employment of two pendulums in proximity to each other, the one pendulum being of a type termed "standard," which is unaffected by the variations in the force of gravity, while the second pendulum is of a type distinctly affected by such variations in the force of gravity.

Claims allowed - 9.

2. MAGNETIC METHODS

(153) METHOD OF AND APPARATUS FOR DETERMINING DIRECTION OF DIP AND STRIKE OF EARTH'S SUBSTRATA

Henry N. Herrick, of Berkeley, California,
Assignor to Standard Oil Company of California,
San Francisco, California, a Corporation
of Delaware.

1,792,639 Patented Feb. 17, 1931.

This invention relates to a method and apparatus for determining the direction of the dip and strike of the earth's substrata, more particularly, to determination of the magnetic properties of a sample taken from the strata of which the direction of the dip and strike are to be ascertained.

An important object of the present invention is simplicity and reliability of methods and apparatus for determining the dip and strike of the earth's substrata from a single borehole.

Claims allowed - 3.

3. SEISMIC METHODS

(154) SEISMOGRAPH AND APPLICABLE TO OTHER MEASURING INSTRUMENTS

John Hugh Jones, of Hastings, England

1,774,379 Patented Aug. 26, 1930.

This invention relates to means for indicating or recording small displacements.

According to the invention the small displacements to be magnified are imparted to a magnetic element--for example, a thin iron strip of suitable shape--held suspended in a direction transverse to a rapidly distorting magnetic field, that is to say, a magnetic field the value of which changes appreciably from point to point, so that the lines of magnetic force are strongly curved. The arrangment is such that the suspended elements will take up a position parallel or nearly parallel to the tangent to the line of force at any particular point, and thus if a small mirror is attached to the suspended element and the suspended element and the source of the field are moved relatively to one another there will be a rotation of the mirror proportional to the displacement of the suspended element, provided this displacement is small. Small displacements of the suspended element otherwise indiscernible may thus be indicated or recorded.

The means described may be employed to record small earth movements imparted to a pendulum or seismograph of either the horizontal or vertical type. It also may be employed in connection with a balance.

Claims allowed - 4.

(155) SYSTEM AND METHOD FOR GEOPHYSICAL EXPLORATION

Frank Rieber, of San Francisco, Calif.

1,782,445 Patented Nov. 25, 1930.

The objects of the invention are (1) to make it possible to obtain readily interpretable data from artificially produced shocks; (2) to make it possible to secure complete data with relatively few detonations; (3) to provide a system for geophysical explorations, which yields extreme accuracy; and (4) to provide such a system, the operation of which is affected by a minimum number of uncontrollable factors that enter into the plotting of the results obtained. The means for the accomplishment of the objects are explained.

Claims allowed - 3.

(156) METHOD FOR MAKING SUBTERRANEAN SURVEYS

Harvey C. Hayes, of Washington, District of Columbia

1,784,439 Patented Dec. 9, 1930.

The present invention is based upon the phenomenon of variation in the coefficients of absorption and reflection in accordance with the frequencies of the waves transmitted, as well as the media of transmission of reflection.

Claims allowed - 9.

(157) SEISMOMETER

Henry G. Taylor, of Beaumont, Texas, Assignor
to Geophysical Exploration Company, of Beaumont,
Texas, a corporation of Delaware.

1,789,055 Patented Jan. 13, 1931.

One of the outstanding aims of the invention is to provide a novel thread suspension for the free end of the inertia mass, which suspension makes possible the conversion of the vertical motion of the inertia mass into a rotary motion so as to make such motion more readily adaptable to registration on a photographic film by means of a ray of light.

Claims allowed - 36.

(158) METHOD OF SEISMOLOGICAL RESEARCH

Austin N. Stanton, of Iowa City, Iowa.

1,790,080 Patented Jan. 27, 1931

Patent discloses improvements in a method of seismological research by which the depth is calculated directly from the frequency. The method involves a device, which is called a "geo-oscillator", to create, periodically, strong pressure on the surface of the earth, the frequency of which can be varied from time to time; and a resonance indicator which records the consequent movement of the earth's surface at the same or a nearby point.

Claims allowed - 7.

(159) ELECTRICAL RECORDING SEISMOGRAPH

By Hugo Benioff

Pasadena, California, Assignor to Carnegie
Institution of Washington, of Washington,
District of Columbia, a Corporation.

1,784,415 Patented Dec. 9, 1930.

The object of this invention is to provide a seismograph whose response shall provide a measure of or be proportional to the kinetic energy of the earth particles or to that due to both the positive and negative velocities of the earth particles; another object is to provide the necessary damping of the seismometer pendulum by properly proportioning the strength of the main field and the resistance of the circuit, whereby additional damping means are unnecessary.

Claims allowed - 4.

4. ELECTRICAL METHODS

(160) ELECTRICAL PROSPECTING

By Emil Edward Mueser

Mountain Lanes, New Jersey

1,791,933 Patented Feb. 10, 1931

The object of this invention is to overcome the effect of undesirable magnetic fields set up by the flow of currents through the generator or other supply of electrical energy and through the leads connecting the generator to the electrodes and through other apparatus associated with that part of the system which supplies the current to the earth.

This patent discloses how this undesirable magnetic field may be confined to close proximity with the apparatus or connecting wires in which it is produced by covering the apparatus and connecting wires with metallic shielding of high permeability and conductivity.

Claims allowed - 2.

(161) METHOD AND APPARATUS FOR LOCATING CONDUCTIVE BODIES

By John J. Jakosky

Los Angeles, California, Assignor to the
Radiore Company, of Los Angeles, California.

1,792,910 Patented Feb. 17, 1931

This patent discloses means for the employment of a transmitting or energizing apparatus which is adapted to set up an electromagnetic field at points below the earth's surface which is much more intense than that created at equal depths by any of the transmitting means heretofore employed, for the same power consumption and approximate size and cost of equipment.

Claims allowed - 8.

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[3] - The first figure refers to the number of the abstract, the second to the method of prospecting as indicated in the Table of Contents, and the third to the page.

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May, 1931

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DEPARTMENT OF COMMERCE -- BUREAU OF MINES

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[1] - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6500."

[2] - Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(162) CONTRIBUTION TO THE QUESTION OF THE DISPLACEMENT OF THE ZERO POINT OF THE TORSION BALANCE IN A GRAVITY VARIOMETER (IN RUSSIAN)

By D. G. Uspenski

Transactions of the Institute of Applied Geophysics, Leningrad, U.S.S.R., vol. 6, 1930, pp. 3-10.

In this article the author gives the results of the tests carried out in the Gravimetrical Laboratory of the Institute of Applied Geophysics concerning the temperature effects upon the displacements of the beams of a gravity variometer.

The tests were performed under conditions similar to those described in the previous work of the author published under the same title (see Geophys Abs. No. 9, p. 5). By working with instruments devised by the Institute of Practical Geophysics, the state of equilibrium of the beam can be established by measuring the damping sinusoids registered by the beam.

The results of the tests are considered to be successful.--W. Ayvazoglou.

(163) OBSERVATIONS WITH GRAVITY VARIOMETERS AT THE SLAVIANSK SALT DEPOSITS IN 1928-29 (IN RUSSIAN)

By D. G. Uspenski

Transactions of the Institute of Applied Geophysics, Leningrad, U.S.S.R., vol. 6, 1930, pp. 11-27.

These observations were carried out in the winter of 1928-29.

Contents of the article:

1. Instruments and accessories.

2. Observations with gravity variometers.

3. Efficiency of the instruments and analysis of failures.

4. Shift of the zero point and accuracy of instruments.

Two gravity variometers constructed by the Seismological Institute, Academy of Sciences, and by the Institute of Applied Geophysics (Type 1928, Nos. 239 and 240) were used.

The author gives a series of tables in which the work of Russian instruments is compared with Schweydar-Bamberg's model and Hecker's large model (the data for the latter two being taken from the observations made in Krivoy Rog in 1927).

In conclusion the writer says that, based on the comparative data given, the Russian instruments of the 1928 type must be considered more suitable than Bamberg's and Hecker's instruments, as they have shown higher efficiency in spite of more difficult conditions of work.--W. Ayvazoglou.

(164) THE QUANTITY $\frac{\partial g}{\partial z}$ AND ITS ROLE IN GEOPHYSICS

By M. A. Sadovsky

Transactions of the Institute of Applied Geophysics, Leningrad, U.S.S.R., vol. 6, 1930, pp. 28-47.

This paper deals with the possibility of measuring the quantity $\frac{\partial g}{\partial z}$ the anomalous gradient of gravity tension along the vertical, and of applying the said gradient to the solution of problems concerning mass distribution in the upper layers of the earth crust. It has not been so far possible to determine this quantity with a sufficient accuracy, although the knowledge of it would be of a very great help for the solution of many practical as well as theoretical problems.

The following principal cases in which the quantity $\frac{\partial g}{\partial z}$ could be applied are mentioned:

1. Reduction of pendulum observation.
2. The solution of the problem on the structure of the upper layers.
3. The definition of the mean density of the earth and of the shape of the geoid.

From the mathematical calculations given in this article the author concludes that the technical realization of such an instrument is impossible. Moreover, such an apparatus would probably possess numerous defects which would considerably reduce the range of its application.--W. Ayvazoglou.

(165) A BRIEF ACCOUNT OF THE RESULTS OF GRAVIMETRICAL PROSPECTING AT THE PRIMARY PLATINUM DEPOSITS IN THE DISTRICT OF NIJNI-TAGIL

By P. M. Nikiforov and S. K. Ghirin

Transactions of the Institute of Applied Geophysics, Leningrad, U.S.S.R., vol. 6, 1930, pp. 48-58.

The purpose of the investigation described in this article may be summed up as follows:

1. To establish the outlines of the platinum-bearing dunite massif among the rocks surrounding it.
2. To determine the thickness and the position of the massif.
3. To isolate the parts of the dunite massif containing chromite as the latter forms the main primary platinum deposits.

Observations were made with instruments constructed in the workshops of the Seismological Institute of the Academy of Sciences. Two hundred and seventeen observations were taken.

This paper deals with the characteristics of physical values obtained and contains, besides, some conclusions drawn from the study of the whole material.

The anomalous gradient values of the force of gravity are shown on the annexed diagrams.

The authors conclude that their attempt to study the geological problem by gravimetrical method has yieldod good results and all the questions, in spite sometimes of schematical solutions given, have been answered. The work will be continued in order to clear up the points of the problem not sufficiently disclosed.—W. Ayvazoglou.

2. MAGNETIC METHODS

(166) REMANENTER MAGNETISMUS UND GESTEINSFLUIDITÄT

(REMANENT MAGNETISM AND THE MAGNETIC FLUX OF ROCKS)

By J. Koenigsberger

Zeitschrift fuer Praktische Geologie, Halle,
vol. 39, No. 2, 1931, pp. 26-27.

In this article the author gives a comparison of the results of experiments carried out by different methods on the determination of the susceptibility and the remanent magnetism of rocks. The methods discussed are those used by K. Puzicha, G. Grenet, and J. Koenigsberger (see Geophys. Abs. Nos. 22, p. 4; 20, p. 5; and 18, p. 4, respectively).

Taking into consideration the fact that samples of rocks taken from the same quarry often display differences in susceptibility, the remanence and the ratio of the remanent magnetism to the induced magnetism amounting sometimes to 100 per cent, the author says that the purpose of his investigation does not concern the accuracy of the methods applied but merely the question of the possibility of quick measurements without making systematic errors.--W. Ayvazoglou.

(167) DIE MAGNETISCHEN GRANITE VON SCHIERKE IM HARZ

(THE MAGNETIC GRANITES OF SCHIERKE IN THE HARZ)

By Kurt Puzicha

Centralblatt fuer Mineralogie, Geologie und Paläontologie, Stuttgart,
Abt. B., No. 1, 1931, pp. 1-6.

The displaying by rock layers of self-magnetism produced by lightning strokes, in addition to their magnetization by the influence of the earth's field, may sometimes be the cause of incorrect conclusions on magnetic anomalies in certain regions, as determined by magnetic surveys.

In order to find out to what extent the magnetic anomaly observed in the region of the granites of Schierke may be influenced by this self-magnetization of the granites the author carried out laboratory investigations of eight samples taken from the border zone of the Brocken-massif and proved that the susceptibilities of these granites were sufficiently high to cause the magnetic anomalies established by Reich.

The results of investigations are described in this article and illustrated by two diagrams. Numerical data are given in a table.--W. Ayvazoglou.

(168) ATMOSPHERIC PRESSURE AND THE STATE OF THE EARTH'S MAGNETISM

By J. M. Stagg

Nature, London, vol. 127, No. 3202, 1931, p. 402.

The author discussed the obtained results pointing to a hitherto unsuspected relation between the type of the diurnal variation of pressure and the general state of magnetic conditions, as regards disturbance and quiet over the earth.

Mean diurnal inequalities of pressure corrected for nonperiodic change were computed for the two sets of days, magnetically quiet and magnetically disturbed, on the basis of the five days of each type per month over the seven years, 1922-1928. By grouping the inequalities according to the season of the year, diurnal variations of pressure were constructed. A further rearrangement of the data gave inequalities illustrating the pressure variations on the two types of days in years of low and high solar activity.

The results are shown in the six pairs of curves, one of which represents the diurnal variation of pressure on magnetically quiet days and the other on magnetically disturbed days. The difference in form of the curves shows the change in the pressure variation from one type of magnetic days to the other.

From these it is clear that in all but the last pair the predominant features of the change are the reduced development of the forenoon maximum and enhancement of the evening maximum on disturbed as compared with quiet days.--W. Ayvazoglou.

3. SEISMIC METHODS

(169) SEISMIC METHODS OF PROSPECTING AS APPLIED IN MINING (IN RUSSIAN)

By Dr. Heise

Gorny Journal (Mining Journal), Moscow,
vol. 106, No. 6-7, pp. 163-166.

After a brief description of the principles of seismic methods of prospecting Heise mentions the great success obtained by this method in prospecting for oil in America, especially in Texas and Louisiana. A map showing, for comparison, the salt domes discovered in these States by geophysical methods, and those known before the introduction of these methods is given.

The possibility of determination by the seismic method of anticlinos, faults and similar irregular dislocations of rock masses makes the application of this method in mining important. In a figure the author gives the contour lines of the region of coal deposit in the Government mines of Hendrik, near Heerlen in Holland, as established by the seismic survey. The survey shows that the relief of the surface of the coal deposit is not as level as could be expected on the basis of the results obtained by drilling a few holes.--W. Ayvazoglou.

(170) BEITRAG ZUR BERECHNUNG VON KONSTANTEN DER GALITZIN'SCHEN APERIODISCHEN SEISMOGRAPHEN

(CONTRIBUTION TO THE CALCULATION OF CONSTANTS OF GALITZIN'S APERIODIC SEISMOGRAPHS)

By E. Büss

Académie des sciences de l'U.R.S.S., Leningrad, Publication
de l'institut séismologique, No. 8, 1930, pp. 1-11

Formulas are derived for working out special tables which may serve for finding the accurate values of the constants during the observations without considerable calculations, so that the necessary adjustments may be made without delay. The tables are added to the article.--W. Ayvazoglou.

(171) SEISMOLOGY AND ENGINEERING

By N. H. Heck

The Military Engineer, Washington, D. C.,
vol. 23, No. 128, 1931, pp. 131-134.

The effect of artificial earthquakes produced by means of large explosions and the outline of the fundamental facts regarding earthquakes, as well as the progress that has been made in understanding them are briefly discussed.

The principles of the construction of seismographs are described and typical seismograms and photographs of various seismographs are given.

The greatest importance of earthquakes from the engineering viewoint with regard to the visible effects on the earth's surface may include: racture along a fault plane with horizontal or vertical slipping along a ertical plane; slipping along an inclined plane; wholesale raising of an rea; wholesale lowering over a large area; and movement of large blocks, ither tilting or raising or lowering.

Thus the effects on structures are very complex.

The study of these effects artificially produced by vibrating platorms (Stanford University) for obtaining valuable information is mentioned.

The author concludes the article by enumerating the organizations orking on the general problems connected with seismological research.--W. yvazoglou.

4. ELECTRICAL METHODS

(172) CALCULATION OF THE POSITION OF THE REFLECTING SURFACE ACCORDING TO OBSERVATIONS MADE BY MEANS OF THE RETURN METHOD (IN RUSSIAN)

By A. Petrowsky

Transactions of the Institute of Practical Geophysics, Leningrad, U.S.S.R., vol. 5, 1930, pp. 3-27.

This paper is a continuation of Petrowsky's article, "Theory of the eturn method" (see Geophys. Abs. No. 1), and is based on the formulas deduced n it. The purpose of this article is to find practical methods by means of hich it would be possible to answer the following questions:

1. How is the reflecting surface situated with regard to the vibrator sending the waves?

2. At what distance from the center of the vibrator is this surface situated?

To answer the first question it is necessary to make a series of bservations of the generation under different positions of the vibrator, hat is, under different angles of inclination of the axis of the vibrator o the reflecting surface. The study of these waves makes it possible to etermine the direction in which the vibrator is perpendicular, as well as he directions in which the vibrator is parallel to the reflecting surface.

The answer to the second question may be obtained from the same eneration curves but also in the following way: The vibrator can be given certain definite position--for example, parallel to the reflecting surface-- nd then generation curves of different lengths of waves may be drawn.

Mathematical details, the knowledge of which is necessary for a orrect calculation of the results, are given.

Diagrams and tables complete the article.--W. Ayvazoglou.

(173) BASES FOR THE CALCULATION OF THE EQUIPMENT REQUIRED FOR ELECTROMETRICAL PROSPECTING (IN RUSSIAN)

By A. Petrowsky

Transactions of the Institute of Practical Geophysics, U.S.S.R., Leningrad, vol. 5, 1930, pp. 28-41.

The author makes an attempt to utilize the results of theoretical works on electrical prospecting for the determination of conditions under which the equipment necessary for this prospecting could be used with the greatest advantage, avoiding all unproductive expenses.

All the calculations are made with regard to a deposit having a spherical shape. The author applies formulas deduced by him in his previous articles: "Natural Electric Field Produced by Ore," and "Determination of the Location, Depth and Thickness of a Spherical Ore Body by Observing the Earth Current Produced" (see Geophys. Abs. No. 1, pp. 13 and 14).

The following questions are discussed:

1. The choice of the dimensions of the field explored and the thickness at the points of observation. The longitudinal dimension of the field must be not less than four times the depth of the center of the spherical ore body and the thickness at the points of observation not less than two-tenths of this depth. Transversal dimensions in the case of a spherical form of the ore body must be equal to the longitudinal ones, thus the application of a square field with 21 points in both longitudinal and transversal directions is most reasonable.

2. Two kinds of prospecting: The experimental--intended only to discover the presence of the ore body; and the detailed--to find the position of the ore body and the other elements characterizing it.

Mathematical calculations for the determination of the magnitude of the deposit by observations made on the natural electric field and calculations on the current strength, intensity and power of the equipment necessary for the observations upon the artificial electric field are given.

The author draws the conclusion that the difficulties of electrometrical prospecting increase quickly with the depth of the ore body, therefore there is no reason to rely upon this method in case of very great depth--

or example, depths reaching a few kilometers. The calculations are applied o an example given at the end of the article.--W. Ayvazoglou.

(174) CALCULATION OF THE GALVANOMETRIC SET FOR THE MEASUREMENT OF THE GRADIENT (IN RUSSIAN)

By A. Petrowsky

Transactions of the Institute of Practical Geophysics, Leningrad, U.S.S.R., vol. 5, 1930, pp. 42-44.

As basis for the calculations given in this article the theoretical ormulas derived by the author in his articles: "Theory of the measurements f earth currents" and "Bases for calculating the observations of earth currents" see Geophys. Abs. Nos. 1 and 2) are used. Calculation of the sensitiveness f a galvanometer under which it becomes unsuitable for the work is the purpose f this article. Petrowsky concludes that: "For the work on a damp ground $= 10^4\ \Omega$ cm^2/cm) it is necessary to use a galvanometer with the sensitiveess equal to 0.4/μ A, while on a dry ground ($\rho = 10^5\ \Omega$ cm^2/cm) this sensitiveess must be equal to 0.04/μ A."--W. Ayvazoglou.

(175) ONDOMETRICAL WORK CARRIED OUT IN THE INSTITUTE OF PRACTICAL GEOPHYSICS (IN RUSSIAN)

By A. Petrowsky, R. Skariatin, A. Seleznev, B. Dostovalov and L. Kleiman

Transactions of the Institute of Practical Geophysics, Leningrad, U.S.S.R., vol. 5, 1930, pp. 45-69.

The beginning of the ondometrical work (i.e. the application of elecromagnetic waves to ore prospecting) took place in 1923. During that year and he following the first portable frame transmitter of small power, intended for re prospecting, which worked according to Meissner's scheme, was constructed n collaboration with the Leningrad Electrotechnical Experimental Laboratory figures of the apparatus are given).

The experiments with this transmitter, which had been carried out in he Ilezk salt mines during the summer of 1925, proved the possibility of adio connection through the salt at small distances (about 100 to 150 meters) y means of a pair of such sets.

The experience obtained resulted in the construction of a new transitter which was tried out in the Ilezk salt mines during the summer of 1927.

In 1928 there was constructed a new receiver (shown in two figures). n expedition to the Tchiraghi-Dzor mines, Caucasus, was equipped with these nstruments. The aim of the expedition was to find out the possibility of ransmitting the signals through the quartz rocks and the application of the hadow-method to the discovery of the pyrite bodies. The work was carried ut as follows: The sender was placed within a drift and the receiver was oved from point to point on the day-surface.

The intensity of the signals received was read at every point by means of a galvanometer. Experiments were made also, with the receiver placed inside of the drift and the transmitter on the day-surface.

The following results were obtained from these experiments:

1. The possibility of the radio transmission of electromagnetic waves, 50 to 250 meters in length, through quartz rocks must be considered to be proved definitely.

2. Radio transmission took place in both direct as well as inverse directions.

3. An ore body (pyrite) placed behind the sender had no marked influence upon the radio transmission.

4. An ore body (pyrite) placed in the path of the electromagnetic waves produced an electromagnetic shadow.

During the tests the authors established the influence of the length of the wave upon the intensity of the signals. In several cases a clear minimum was observed; the reason for this minimum could not be established but it was curious that the length of the wave to which this minimum corresponded was almost equal to four times the average height of the trees surrounding the drift in which the transmitter was operated.

Thirty figures illustrate the article.--W. Ayvazoglou.

(176) A NEW DEVELOPMENT IN ELECTRICAL PROSPECTING

By Hans Lundberg and Theodor Zuschlag

The American Institute of Mining and Metallurgical Engineers, New York,
Technical Publication 415. 1931. 18 pp.

A new measuring procedure permitting potential drop ratio determinations is described. After a brief description of the classification of electrical methods into qualitative and quantitative ones, and the further subdivision of the latter into potential drop and potential ratio techniques, the authors point out the advantages which would accrue from the elimination of certain deficiencies in potential ratio studies. These deficiencies are due to the existence of unknown and variable contact resistances at the earth connections. These contact resistances may be eliminated by a mathematical procedure which was made the basis of the design of the potential drop ratio compensator called the "Racom," developed by Zuschlag.

Generally speaking, the Racom is a sensitive bridge arrangement for the accurate and speedy execution of potential drop ratio determinations, and is thus adapted to geoelectrical exploration. The principles of its operation and use are described with reference to a series of figures. The results of four actual investigations, including ore hunting, determining the depth of water and of bed rock and depicting the underlying geological columns at various stations of interest to the oil geologist are discussed.--W. Ayvazoglou.

(177) HUNDERT JAHRE ELEKTRISCHE BODENFORSCHUNG

(ONE HUNDRED YEARS OF ELECTRICAL PROSPECTING FOR ORE)

By B. Duschnitz

Kali, Berlin, vol. 25, Nos. 5 and 6, 1931, pp. 71-76 and 88-92.

Duschnitz gives an interesting sketch of the development of the lectrical methods of prospecting since 1830. Beginning with the first ex-eriment carried out by Robert W. Fox (Philosophical Transactions, 1830, pp. 99-414), and after having mentioned the names of a series of other investi-ators, the author gives a more detailed description of prospecting for ore arried out by electrical waves according to Trüstedt (1901).

The methods originated by Löwy and Leimbach, called by them: (1) he reflection method; (2) the absorption method; (3) the capacity method; 4) the interference method; and (5) the method of quarter waves (Viertel-ellenmethode) are discussed, their application at different places is des-ribed and conclusions are drawn.

All the electrical methods of prospecting are divided by the author nto three main groups:

1. Prospecting by means of Hertzian waves.
2. Prospecting by means of natural earth-currents.
3. Prospecting by means of artificial currents produced in the ground.

Although all the three groups supplement one another, the third roup is considered the most important one, as these methods make possible he obtaining of a graphic picture of the area under investigation.

The application of the electrical methods of prospecting by chlumberger, Ambronn, Heine, Krahmann and many others is mentioned.

A long list of literature is added.--W. Ayvazoglou.

(178) A THEORETICAL STUDY OF APPARENT RESISTIVITY

By J. N. Hummel

American Institute of Mining and Metallurgical Engineers, New York,
Technical Publication ~~31~~ 418, 1931, pp.

A number of surface potential methods and the relation of potential istribution to subsurface resistivity are discussed. The principal field of pplication of these methods is the investigation of strata with horizontal or nearly horizontal) bedding planes. Absolute potential differences are easured along a line at the surface. Of all possible arrangements of lectrodes, five are listed which are most suitable from the standpoint of field procedure and clearness of interpretation. From the potential differences, the subsoil resistivity, termed "apparent resistivity," may be computed. It changes with the distance between the secondary electrodes and is also a function of the resistivities of the surface formations as well.

The cases of a spherical mass, a 2-layer problem, and a 3-layer problem, are analyzed. In the layer problems, the author makes use of the theory of images.

From the potential, the expression for the apparent resistivity is derived as a function of the distance between the secondary electrodes. Several curves are given for different ratios of resistivity. In the 3-layer problem, an approximative curve is computed which approaches the true curve for large distances, and the true curve can be found by graphical interpolation. This procedure greatly simplifies the mathematical analysis.--Abstract from Mining and Metallurgy, vol. 12, No. 292, 1931.

(179) ELECTROMAGNETIC ABSORPTION BY ROCKS WITH SOME EXPERIMENTAL OBSERVATIONS TAKEN AT THE MAMMOTH CAVE OF KENTUCKY

By J. Wallace Joyce

U. S. Department of Commerce, Bureau of Mines,
Technical Paper 497, 1931, 28 pp.

This paper endeavors to shed some light on the question of the penetration of electromagnetic fields or waves into the ground. It is intended to settle definitely the fact that such waves penetrate the earth's surface and that, in so doing, absorption occurs. The question is vital to geophysics, since the successful operation of all induction methods depends upon this factor.

Contents of the article:

1. Fundamental principles of induction methods.

2. Factors influencing reaction of conducting bodies.

3. Absorption formulas (Maxwell's, Zenneck's, King's and Sommerfeld's absorption formulas).

4. Comparison of absorption formulas.

5. Theory of method of experimental measurement of absorption.

6. Formulas for calculation of coefficient of mutual inductance between two circular loops with planes parallel and not in the same plane.

7. Experimental work (early work, site of work, preliminary tests, qualitative work, quantitative work, procedure, experimental results).

8. Discussion of results.

In conclusion the author says that the fact that electromagnetic aves actually penetrate rock has been definitely established. A start has een now made toward the quantitative verification of absorption formulae, nd with the material contained in this paper as a foundation, additional xperimental facts will be obtained in the near future which will no doubt rovide a groat additional amount of valuable information.

The results of this investigation show that a frequency of 500 ycles per second is well suited for electromagnetic prospecting. Absorption, lthough present, does not materially limit the applicability of this method.
--W. Ayvazoglou.

(180) EARTH-RESISTIVITY MEASUREMENTS IN THE COPPER COUNTRY, MICHIGAN

By W. J. Rooney

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md.,
vol. 32, No. 3/4, 1927, pp. 97-126.

During the summer of 1927 the Department of Terrestrial Magnetism f the Carnegie Institution and the Michigan College of Mines and Technology ointly conducted a series of earth-resistivity measurements in the copper ountry of northern Michigan, where the geological structure is well known, o determine the value of measurements of resistivity and its variations as ndications of the geological structure below the surface. The work done ay be roughly divided in two parts: First, measurement and study of the ariations in resistivity with depth, or with volume, to establish such genral relations as exist between the two; and, second, the determination of he resistivity of specific rock-flows, in order that more fundamental data e made available as an aid to the interpretation of the results of the former ype of measurement.

The results of the first part of the investigation bear out the evience from previous work that resistivity-determinations may be used to adantage in determining the location of certain underground discontinuities. he data obtained in the second part on the resistivity of specific rocks are lso in line with previous results. The resistivity of porous, sedimentary ocks was usually under 20,000 ohms per centimeter cube, while traps and ssociated rocks of volcanic origin were found to have resistivities from five o twenty times as great.--Author's abstract.

5. RADIOACTIVE METHODS

(181) A MORE ACCURATE AND MORE EXTENDED COSMIC-RAY IONIZATION-DEPTH CURVE, AND THE PRESENT EVIDENCE FOR ATOM-BUILDING

By Robert A. Millikan and G. Harvey Cameron

The Physical Review, Minneapolis, Minn.,
vol. 37, No. 3, 1931, pp. 235-252.

The cosmic-ray ionization-depth curve has been extended at both ts upper and lower ends and made more accurate throughout. The absorption coefficients obtained directly from the slope of the curve run from $\mu = 0.35$ per meter of water at the top (Pike's Peak) to $\mu = 0.028$ at the bottom (80 meters or 262 feet of water below the top of the atmosphere), thus bringing to light both softer and harder components than the authors had before found. Strong quantitative evidence is presented, on the basis of the Klein-Nishina formula, that the strongest and most absorbable cosmic-ray band arises from the act of formation of helium out of hydrogen. Striking quantitative evidence is found that the three more penetrating bands are due to the formation out of hydrogen of the only other abundant elements oxygen (C, N, O) silicon (Mg, Al, Si, S) and iron (iron group). Two independent proofs are given that the cosmic-rays enter the earth's atmosphere as photons; namely, (1) they are quite uninfluenced by the earth's magnetic field, and (2) the ionization produced by them in a closed vessel does not increase continually in going to the top of the atmosphere, but passes through a maximum. It is shown to follow that the cosmic rays, in coming from their place of origin to the earth have not passed through an amount of matter that is appreciable in comparison with the thickness of the earth's atmosphere and that they must therefore originate in interstellar space rather than in the atmospheres of the stars. Some participation of the nucleus in the absorption of cosmic rays is brought to light.--Authors' abstract.

(182) ZUR METHODIK DER JONENZÄHLUNG IN DER FREIEN ATMOSPHÄRE

(CONCERNING THE METHOD OF COUNTING IONS IN THE FREE-AIR)

By Yo Itiwara

Physikalische Zeitschrift, Leipzig, vol. 32, No. 2, 1931, pp. 97-106.

The author points out that if ion tube-counters which are assigned for measuring the total number of all the small and large ions existing in the free air are used according to the method of charging (Auflademethode),--that is, the external electrode of the cylindrical condenser is kept at a constant potential and the charging of the inner electrode, which is connected with the earth, is measured,--not the total number of ions is measured, as has been accepted so far, but only one fraction of it.

The reason for this phenomenon consists of the fact that the charged external electrode produces at the place of the entrace of the ions a field by which a certain fraction of the ions is prevented from entrance into the counting apparatus.

The author proves by an experiment that large ions only are measured by the tube-counter described by A. Gockel and used by V. F. Hess during his measurements in Helgoland. Based on this fact, some results of Hess' measurements are to be corrected in order to obtain better conformity of his results with those procured by J. J. Nolan and his collaborators.--Author's abstract translated by W. Ayvazoglou.

The above article is followed by V. F. Hess's "Remarks concerning Yo Itiwara's work" in which Hess disagrees with some results of measurements obtained by Itiwara and recommends that Itiwara's experiments be repeated in t free air and under a different form.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(183) GEOPHYSICAL METHODS WITH SPECIAL REFERENCE TO COAL MINING

By E. Bein and H. Bertram Bateman

The Colliery Guardian, London, vol. 142, No. 3666, 1931, pp. 1182-1183.

In this article the authors point out in a general way the applicability of geophysics to coal mining.

They divide the problems which arise in respect to coal mining into two classes:

1. The direct location of coal seams and their position, thickness, etc.

2. The location of zones of disturbance associated with coal seams.

The applicability of the different geophysical methods is examined from the standpoint of exceptional cases, that is, cases where the circumstances are so favorable that the physical characteristics of a sufficiently thick seam make it definitely distinguishable from the strata above and below.

The following methods are discussed:

Gravimetric Investigations. - The torsion balance can not directly locate a coal deposit, but it can under certain circumstances locate the underlying stratum should the latter be inclined and show a distinct density difference from the overlying stratum. Topographical conditions should be as uniform as possible.

Electric Investigations. - The electrical method is inapplicable, as coal is a mineral which shows great variations of electric conductivity, depending on its composition and water content.

Seismic Investigations. - Exact depth estimates can be given only in cases where the order of the strata is such that the travel time of the elastic waves is always greater in the one stratum than in that overlying it, and less than in that of the underlying stratum. These conditions are sometimes found in brown-coal fields. Therefore, only in exceptional cases can the seismic method elucidate problems concerning the actual coal seam. Good results can be produced where it is a question of reaching the floor of the bed. Should the coal seam crop out, then there is every possibility of locating its strike, and even perhaps of determining its depth.

Geothermic Measurements. - Geothermic measurements can often be of great value and should be carried out systematically as drilling progresses.

Magnetic and Radioactive Methods. - There can be no question of using magnetic and radioactive methods for the direct investigation of coal deposits, ad the physical conditions necessary for the application thereof do not exist.

Of particular importance are zones of disturbance causing (1) displacement, and (2) decomposition of seams.

To the first class belong faults and thrust faults; to the second belong such occurrences of eruptive rocks, principally basalt and dolerite, as appear in some English coal fields, intrusions, sheets, etc.

It is quite certain that more may be expected from geophysics as a means of solving such problems than as a means of directly locating coal seams.

--W. Ayvazoglou.

(184) GEOPHYSICAL EXAMINATION OF METEOR CRATER

By J. J. Jakosky, C. H. Wilson and J. W. Daly

The Mining Journal, Phoenix, Ariz., vol. 14, No. 22, 1931.

Of the various theories advanced regarding the origin of Meteor Crater, two have been considered as most probable:

1. That the crater was formed by a meteroite or a swarm of meteoric material.

2. That it was formed by a "steam explosion" from hot solutions of gases.

The general purpose of the present geophysical work was to obtain information regarding the origin of the crater, and also as to the advisability of continuing with the exploration, and in particular where such exploration efforts should be directed.

Three main independent studies were carried out:

1. Geological. - The geology of Meteor Crater stratigraphy, its structure, conclusions on which the meteoric origin of the crater is based, as well as geologic age of Meteor Crater are discussed.

2. Electrical. - Factors governing electrical methods, apparatus used and general theory, plans of the electrical survey, and general summary of electrical work are examined.

3. Magnetic Investigations. - Theory, external field of meteoric mass, measurements, field procedure, masking effect of the crater-fill, regional gradient, anomalies in the crater, and the summary of the magnetic work are given.

In the "General summary of geophysical-geological results" the authors draw the following conclusions from the correlation of the geological, electrical, and magnetic studies:

1. From a geological examination the authors believe that the crater was formed by impact of a meteorite or a swarm of material.

2. The electrical survey gives indications of the presence of an area of higher conductivity in the southwest quadrant of the crater between the center and the rim. The main mass of this material lies at an effective depth of approximately 750 feet. A careful study of the original and altered materials found in the area indicates that this zone of higher conductivity is not due alone to fill material or structural conditions. The conclusions are that this zone contains meteoric material.

3. The magnetometer survey indicates the presence of an area containing magnetic material in the southern portion of the crater. This material starts at depths of approximately 200 feet and continues downward, probably concentrating with depth.

4. The geological evidence and the electrical and magnetic indications would individually be classed as fair or moderate effects of a buried mass. The general agreement as regards plan, location, depth, and other factors gives sufficient added strength to the results to warrant further explorations to the extent of churn drill holes, in the southwest gradient of the crater.

5. Results of the work are not considered sufficiently definite, in view of complicating factors encountered, to warrant calculations or predictions regarding the tonnage or mass of material which may be present. The chief result of the work has been to delineate definitely the area wherein future development work is to be concentrated.

6. The water level in the crater is comparable with the water level outside of the crater.

Figures of east-west and north-south sections, showing the probable structure of Meteor Crater, are given.—W. Ayvazoglou.

(185) GEOPHYSICAL SURVEYS IN OIL TERRITORIES

By J. B. Ostermeier

Oil News, London, vol. 28, No. 940, 1930, p. 546.

Speaking on geophysical methods of prospecting, the author states that gravimetric surveys in oil territories, particularly where the oil occurs in connection with salt deposits, have already reached considerable proportions by reason of the clear interpretation of the results of measurements allowed by this method. Seismic surveys give their most valuable results when comparative horizontal strata are involved.

These two methods are recommended for use with advantage when large areas have to be covered and if the preliminary work or its continuation is to be undertaken on a large scale and regardless of cost. The other methods discussed are the electrical and magnetic ones.

The possibility of the determination of synclines by geophysical methods and the particular importance of this fact to oil prospecting is mentioned.—W. Ayvazoglou.

(186) GEOPHYSICAL PROSPECTING DISCUSSED BY THE ST. LOUIS SECTION

By H. S. McQueen

Mining and Metallurgy, New York, vol. 12, No. 291, 1931, p. 172.

This paper is the report of a meeting held at the Missouri Athletic Association on January 17, 1931, at which H. A. Buehler, State Geologist, spoke on "The Results of Geophysical Prospecting by the Missouri Geological Survey During the Past Two Seasons."

The Geological Survey carried on field work in two branches of geophysics; namely, magnetometer survey and electric resistivity measurements. The studies have been confined to the iron ore deposits of the Ozark region, the lead deposits of southeast Missouri, and, to a lesser extent, to the high-alumina clay deposits of the north-central Ozark region.

The magnetometer surveys have been successful in outlining the configuration of the pre-Cambrian surface, and particularly the location of pre-Cambrian porphyry "highs" which in some instances bear a definite relation to the location of ore bodies in the adjacent sedimentary rocks. The results have also been applied to the solution of deep well water problems.

The Gish-Rooney method was used in the earth-resistivity measurements. This method of prospecting has been confined chiefly to the sinkhole type deposits of red hematite occurring in the central Ozark region. Detailed work indicates that the general area of the sink can be outlined and information obtained regarding the depth of the structure.

Measurements were also made over sink-hole type deposits containing diaspore clay. The thickness of the overburden and the thickness of the clay check very closely the results of drilling.--W. Ayvazoglou.

(187) THE GEOPHYSICAL DISCUSSIONS

Editorial note

Mining and Metallurgy, New York, vol. 12, No. 291, 1931, pp. 151-153.

This is a brief description of two sessions held by the Committee on Mining and Metallurgy on papers on geophysics. The following papers were discussed:

1. Resistivity Measurements upon Artificial Beds, by J. H. Swartz (see Geophys. Abs. No. 23).

2. Experimental Observations of Electromagnetic Absorption at the Mammoth Cave of Kentucky, a report on the results of work undertaken by J. Wallace Joyce, A. S. Eve, D. A. Keys, and F. W. Lee. Joyce discussed the relative value of various absorption formulas for different frequencies, and pointed out the necessity of applying experimental checks.

3. New development in electrical prospecting, by Hans Lundberg and Theodor Zuschlag (see Geophys. Abs. No. 25).

4. Electrical exploration applied to geological problems in civil engineering, by E. G. Leonardon (see Geophys. Abs. No. 24).

5. Mathematical theory of electrical flow in stratified media, by D. O. Ehrenburg and R. J. Watson (see Geophys. Abs. No. 24).

6. Analysis of some seismic prospecting field data, by L. Don Leet and Maurice Ewing in which they presented some formulas for time distance curves and emphasized the importance of curved paths of seismic impulses.

7. A magnetic method of estimating the height of some buried magnetic bodies, by A. S. Eve (see Geophys. Abs. No. 24).

8. Practical geomagnetic exploration with the Hotchkiss Superdip, by Noel H. Stearn (see Geophys. Abs. No. 19).

9. Method for determining the magnetic susceptibility of core samples, by William M. Barret (see Geophys. Abs. No. 24).

10. Geophysical examination of Meteor Crater, Arizona, by J. J. Jakosky, C. H. Wilson and J. W. Daly (see Geophys. Abs. No. 25).

The meeting was adjourned after a strong request was voiced for more papers dealing with the intricacies of interpretation of the field readings, together with practical illustrations from experience of how conclusions are drawn from the data obtained. These are things that have not been divulged to any extent by commercial companies, who have left it to the Government experimenters to describe these secrets. For the benefit of all concerned, a more open-handed policy might well be adopted.—W. Ayvazoglou.

(188) OPENING OF COASTAL FIELD SHOWS VALUE OF GEOPHYSICS

By Jack Logan

The Oil Weekly, Houston, Tex., vol. 60, No. 8, 1931, p. 74.

The author enumerates a series of geophysically discovered salt-dome prospects in which production has been established with the first well following geophysical work (Sugar Land, Port Neches, and Bloomington fields in Texas, and Port Barre, East Hackberry, Lake Pelto, Bay St. Elaine, Dog Lake, and Cameron Meadows in South Louisiana).

Numberous other fields have come in with the second or third test following geophysical work, among them being Hankamer and Esperson; while there have been many other instances in which dome formation (cap rock or salt) has been established in one, two, or three tests.

Logan concludes by saying: "The fulfillment of the geophysical interpretation is noteworthy."—W. Ayvazoglou.

(189) GEOPHYSICAL PROSPECTING FOR OIL AND GAS

By James C. Templeton

The Petroleum Times, London, vol. 25, No. 630, 1931, pp. 175-176.

In this address delivered before the Oil Industries Club, London, Templeton outlined the most important methods of geophysical prospecting. He expressed the opinion that the gravitational and seismic methods were by far the most important ones, the magnetic method being used in areas where the geological conditions were particularly suitable for that method of investigation, while the different types of electrical methods had only a very limited application in oil prospecting. In connection with electrical methods Templeto made reference to the new development, namely the electrical logging of wells.

The great progress made in the improvement of geophysical instruments and equipment, as well as great advances in the mathematical analysis and the geological and geophysical relationship were discussed.--W. Ayvazoglou.

(190) ÉTUDE DE L'INFLUENCE DE QUELQUES FACTEURS GÉOPHYSIQUES SUR LES POINTS DE CHUTE DE LA FOUDRE

(STUDY OF THE INFLUENCE OF SOME GEOPHYSICAL FACTORS UPON THE POINTS WHERE LIGHTNING STRIKES)

By L. N. Bogoiavlensky

Laboratoire Radiologique de la Chambre Centrale des Poids et Mesures,
Leningrad, U.S.S.R., 1931, 12 pp.

The author describes his studies on the conductivity of the atmospheric air and of the soil in localities often struck by lightning.

Four different methods were used:

1. Method of radiometric prospection according to penetrating radiation.

2. Measurements of the electrical conductivity of the atmospheric air by Gerdien's apparatus.

3. Method of electrometric prospection by using artificial electric fields.

4. Method of electrometric prospection of natural electric fields.

Conclusive results were obtained from the first three methods; the results have proved that the values of the intensity of terrestrial penetrating radiation, as well as those of the electrical conductivity of the atmospheric air are always higher in places often struck by lightning.

The electrical conductivity of the ground also reaches it maximum at the points with a maximum intensity of penetrating radiation.

The experiments were carried out in two different localities 200 ilometers from Leningrad, the ground of which consisted of sedimentary rocks clay and sandstone) of the Devonian period covered with deposits in the form f bowlders of crystalline rocks of the ice period.

Thirteen diagrams are added to the article.--Author's abstract ranslated by W. Ayvazoglou.

8. GEOLOGY

(191) SHAPING THE EARTH

By William Bowie

Journal of the Washington Academy of Sciences, Baltimore, Md.,
vol. 21, No. 6, 1931, pp.

In this address delivered before the Academy in January, 1931, Bowie iscussed the question of "Shaping the earth" under the following headings: 1) The crust of the earth; (2) formation of oceans and continents; (3) known acts about the earth; (4) isostasy; (5) the figure of the earth; (6) effect f topography on geodetic data; (7) variations of gravity; (8) comparison of ratt and Airy hypotheses; (9) assumptions underlying isostatic investigations; 10) some isostatic conclusions; (11) isostatic adjustments and earthquakes; 12) objections to the contraction hypothesis; (13) diastrophic forces; (14) rosion and sedimentation; and (15) thermal changes in crust.

In his conclusion Bowie says:

> "Isostasy is now widely recognized as a scientific problem. Its advocates hold that there is a maintenance of the isostatic equilibrium as materials are moved from one place to another over the earth's surface. These are the physical facts which are related to the processes involved in changes in the earth's surface. They have been proven by actual physical measurements. It has been stated that there are great horizontal movements in mountain areas, but that isostasy and its maintenance call for only vertical movements. My answer to this is that I recognize the horizontal movements in mountain areas, but believe that these horizontal movements are incidental to the vertical movements which are involved in maintaining the isostatic balance and which also result from the changes in the temperature of crustal matter brought about by the maintenance of equilibrium. There is an abundance of space in a mountain area for horizontal movements to occur, and it seems to me that it is easier to explain these movements as resulting from upward or downward moving material than as resulting from a shrinking interior of the earth and a collapsing crust.
>
> Isostasy is a geological problem. It was outlined by the great geologist, C. E. Dutton. It has been used by the geodesists merely as an effective means by which to harmonize theoretical and observed values of geodetic data. The geodesists hope that isostasy may prove of great value to geologists in their effort to write the geological history of the earth." --W. Ayvazoglou.

(192) ISOSTASY FROM THE GEOLOGICAL POINT OF VIEW

By Rollin T. Chamberlin

The Journal of Geology, Chicago, Ill., vol. 39, No. 1, 1931, pp. 1-24.

Some of the outstanding geologic facts which have to be taken into account in a consideration of isostasy are enumerated. Mountain building, peneplanation, geosynclines, etc., are considered from the point of view of both geologic deductions and the isostasy theory. It is concluded that no single type of compensation or uniform depth of compensation meets the facts. The real test of the isostatic theory seems to lie in the limited regions of high relief. An attempt is made to show how geologic processes may operate to produce folded mountain ranges exhibiting the observed geologic phenomena and at the same time make it possible to satisfy the requirements of the geodetic determinations. Isostatic forces are in the whole equation of mountain-building forces, and play their appropriate part, but that part is secondary and subordinate.--Author's abstract.

9. NEW BOOKS

93) Handbuch der Geophysik (Handbook of Geophysics). Vol. III, No. 1, 570 pp. 207 illus. "Kräfte in der Erdkruste" (Forces in the earth's crust), by B. Gutenberg; "Plutonismus und Vulkanismus" (Plutonism and Vulcanism), by F. von Wolff; "Erdkrustenbewegungen" (Movements of the earth crust), by A. Born; "Geothechnische Hypothesen" (Geotechnical hypotheses), by B. Gutenberg; "Mechanische Wirkungen von Eis auf die Erdkruste" (mechanical effects of ice upon the earth crust), by H. Hess. Gebrüder Borntrager, Berlin, 1930, Subscription price, 48 marks.

94) Schlumberger, C. Étude sur la Prospection Électrique du Sous-sol (Study of the electrical prospecting of the subsoil). 2nd edition. Paris, Gauthier-Villars et C^{ie}., Editeurs. 1930. 96 pp., 61 figs. Contents: Chapter 1. Trials of electrical prospecting before 1912; (2) electrical conductivity of various rocks and minerals; (3) theoretical study of the method for drawing maps of equipotential lines; (4) method of operation for the establishment of a map of equipotential lines; (5) application of the map to the study of stratified terrain; (6) study of the form of a conducting mass; (7) distribution of the current in depth; (8) incited polarization; (9) spontaneous polarization. The work of electrical prospection carried out in Sweden is briefly described in the annex.

95) Seidl, Erich. Bruch und Fliess-Formen der technischen Mechanik und ihre Anwendung auf Geologie und Bergbau. Band II, Scher Formen; Band III, Zerreiss Formen (Break and flow forms of technical mechanics and their application to geology and mining. Vol. II, Shear forms; Vol III, Tear forms). V D I Verlag, Berlin, 1930, 22 pp. 51 text figs.; 81 pp. 145 textfigures. The following chapters are in preparation: I. Theoretical introduction; IV. Compression forms; V. Forms produced by bending; VI. Forms produced by flowage.

96) Shaw, Capt. H., with the assistance of J. McG. Bruckshaw and S. T. Newing. Applied Geophysics. A brief survey of the development of apparatus and methods employed in the investigation of subterranean structural conditions and the location of mineral deposits. Contents: Introduction; magnetic method; gravity methods; catalogue of exhibits: magnetic, gravity, seismic, electrical; index. Ten plates with illustrations. London, published by His Majesty's Stationery Office, 1931. Price, 2 s. net.

97) von Bernewitz, M. W. Handbook for Prospectors. McGraw-Hill Book Co., New York, 1931, 359 pp. Illus. $3. 2nd edition. The reason for issuing a second edition instead of another printing was to enable the author to add a 40-page chapter on prospecting by geophysical methods.

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[2] - Senior physicist, U. S. Bureau of Mines.

.C.6511.

(201) ZUR FRAGE NACH DEM ISOSTATISCHEN MASSENAUSGLEICH IN DER ERDRINDE

(CONTRIBUTION TO THE QUESTION OF THE ISOSTATIC COMPENSATION OF MASSES IN THE EARTHCRUST)

By A. Prey

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 201-225.

To decide the question raised by Hopfner, whether the isostasy is nothing but an illusion produced by the methods of reduction, a complete numerical investigation has been carried out for the case of a nonisostatic earth. Based on the author's development of the heights of the earth in spherical harmonics, the level surface (geoid) and the values of gravity on the surface of the continents and oceans have been computed. It was thereby taken into consideration that the heights were not to be counted from the surface of a normal earth but from the disturbed level surface. The free-air reduction and Bouguer's reduction were applied, as usual, to the values of gravity obtained in this manner.

It was shown that only in a few regions of the earth were the results of such a kind that an isostatic interpretation according to Hopfner was possible. In general the values of gravity on a nonisostatic earth did not agree with the observations. There was an obvious asymmetry in the north-south and in the east-west direction caused by the terms of the first order in the development. Accordingly, the values of gravity in America and Europe, if treated in the same manner, should differ by approximately 100 · 10^{-3} cm./sec.^{2}, but this does not correspond to the observations. The absence of this difference seems to be a proof of the existence of a compensation of masses in the earth crust.--Author's abstract.

(202) CONCERNING GRAVIMETRICAL WORK IN CENTRAL ASIA (IN RUSSIAN)

By P. A. Savitsky

Department of Geological Prospecting in Central Asia, Tashkent, Information
Bulletin 1, Aug., 1930, pp. 12-14.

A section of applied geophysics has recently been created at the Department of Geological Prospecting in Central Asia for the purpose of a systematic gravimetrical investigation of Central Asia. The investigation is proposed to be carried out in two directions:

1. General gravimetrical survey by pendulums.

2. Gravimetrical survey of single regions by means of gravitational variometers.

The necessity for this work becomes evident, taking into consideration the great importance of the region of Central Asia from the viewpoint of industry.—W. Ayvazoglou.

(203) DETERMINAZIONE GRAVIMETRICA DI INOMOGENEITA PROFONDE INCLUSE IN PIU ESTESE E DIVERSE INOMOGENEITA

(GRAVIMETRICAL DETERMINATION OF HETEROGENEOUS BODIES LYING AT DEPTH AND INCLUDED IN MORE EXTENSIVE BODIES OF VARIOUS HETEROGENEITIES)

By A. Belluigi

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. [illegible] No. 3, 1931, pp. 227-234.

The author examines the gravimetrical influence of an asymmetric anticlinal formation, lying at a depth, which extends in one direction to infinity, remains always in the same position, but has a nucleus or a cavity.

The density of a nucleus should be greater or less than that of the surrounding matter.

The author also suggests the possibility of establishing the reasons for the disturbance by making a graphic-analytical examination of the turning points observed in the profiles.—Author's abstract translated by W. Ayvazoglou

(204) ÜBER DIE MITTELUNG VON GRADIENTEN UND KRÜMMUNGSWERTEN UND DIE ANWENDUNG EINER UNDULATIONS-METHODE AUF SCHWERKRAFTMESSUNGEN

(CONCERNING THE MEAN OF GRADIENTS AND CURVATURE VALUES, AS WELL AS THE APPLICATION OF THE UNDULATION METHOD TO GRAVITY MEASUREMENTS)

By J. Koenigsberger

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 293-297.

To free the observed values of gradient and curvature from perturbations due to the inhomogeneity of the terrane and to instrumental errors, a set of every n (3 - 5) neighboring stations is tied together by a vector polygon; the resulting vector is divided by n. The center of the set is found like the center of gravity of n equal masses. The regional trend of the gradient of a larger area is found in the same way.

Notwithstanding the nondetermination of potential problems, it is possible to locate in the field the depth of border faces of hidden mass by the method of least undulations. A body in the earth does not have a wholly regular form; irregularities, holes, excrescences, channels, etc., of its border cause undulations in the isogams. The extension of an undulation - that is, he distance of half maximum values - is independent of the size of the rregularities and is given only by the depth of these irregularities under he surface of the earth, provided that the size of these irregularities is mall ($\leqq 0.1$) as compared with their depth.

Only the amplitude of undulations varies with the size of the small rregularities. On account of disturbances by nonhomogeneities near the surace of the earth, it would be necessary to make some statistics of the extenion of these undulations.--Author's abstract.

(205) INTERESTING TORSION BALANCE

Editorial note

The Petroleum World, London, vol. 28, No. 368, 1931, p. 146.

A modification of the Eötvös torsion balance is exhibited in the pplied geophysics collection now on show at the Science Museum, South Kinsingon. A description follows:

> The balance consists of a beam suspended by a fine torsion wire, carrying at its extremities two weights at different vertical heights and enclosed in a metal case which can be rotated about a vertical axis. The position of the brass box enclosing the balance arm is indicated by a horizontal circular scale, and the orientation of the arm relative to it is observed by the aid of a mirror fixed on the balance arm, and a telescope.
>
> In order to protect the balance adequately against all external effects which influence its action and equilibrium, it is completely enclosed in a double-walled brass case, the inner and outer walls being 2 mm. and 4 mm. thick, respectively, and separated by an air gap varying between 5 mm. and 10 mm. In this way the balance is protected against radiation, electrical influences, and eddy currents due to variation of temperature, and extreme sensitiveness is obtained.

--W. Ayvazoglou.

(206) A METHOD FOR DETERMINING THE DISTRIBUTION OF SUBTERRANEAN MASSES BY MEANS OF MAGNETIC AND GRAVIMETRIC OBSERVATIONS (IN RUSSIAN)

By G. Gamburtzeff

Journal of Applied Physics, Moscow, vol. 7, No. 2, 1930, pp. 103-105.

In this article Gamburtzeff describes a new method for interpreting magnetic and gravimetric observations by the utilization of optical effects produced by mixing colors. Diagrams serving for calculation of G_z - that is, of the vertical component of the anomalous value of the force of gravity - are discussed only. These diagrams are designed on transparent paper and different colors are applied to them; the amount of light penetrating through any square should be equal for each diagram. The images of several diagrams are then projected upon a screen so that their centers coincide with the most characteristic points (with respect to the curve ΔG_z) distributed along the line of observation (the latter must also be reproduced on the screen).

As the number of the squares included in the area sought for is known for each of the colored diagrams a certain summarized color can be composed for this area. After the mean color of the outline of the area is established, the finding of the area itself consists in finding on the screen an area having the same color. In order to obtain a summarized color for a certain area, an apparatus for the optical mixing of colors must be used. The form and position of the area can be determined by comparison of the colors. The results can be made exact and verified by means of a multigravimeter.--W. Ayvazoglou.

2. MAGNETIC METHODS

(207) THE GEOGRAPHICAL DISTRIBUTION OF MAGNETIC DISTURBANCE

By W. F. Wallis

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 1, 1931, pp. 15-22.

A discussion at the Department of Terrestrial Magnetism of the magnetic results obtained by the two MacMillan arctic expeditions of 1921-22 and 1923-24, and a comparison of these results with those from several other stations, indicate that during magnetic storms the greatest disturbance occurs in the region of the zone of maximum auroral frequency, and that there is a close correlation between the curves of magnetic activity and auroral frequency when both are plotted in relation to magnetic latitude. A study of the propagation of different types of magnetic disturbance indicates that all types are not propagated with the same velocity. Possible causes of terrestrial magnetic disturbances are discussed.--Author's abstract.

(208) VARIATION OF HORIZONTAL-INTENSITY VARIOMETER SCALE VALUE WITH TEMPERATURE

By George Hartnell

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 1, 1931, pp. 29-32.

In a paper on horizontal-intensity variometers, the author developed the mathematical relations underlying the operation of horizontal-intensity variometers and showed how, in the case of quartz-filament suspension, the scale value may be controlled and compensation for temperature secured by use of suitably placed auxiliary magnets. Further development of the formulas shows that if too large a filament is used, change of temperature may have an appreciable effect on the scale value.--Author's abstract.

3. SEISMIC METHODS

(209) DIE ERDBEBEN FINLANDS

(FINLAND'S EARTHQUAKES)

By H. Renqvist

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 145-149.

This is an extract from Henrik Renqvist's work (Finnlands Jordskalv, Fennia LIV, No. 1, 113 pp., 13 figures and 16 tables, Helsingfors, 1930) written by E. Tams, in which the latter says that the thorough monographic work on earthquakes in Finland carried out by Renqvist furnishes a very manifold and stimulating contribution to the study of microseismic phenomena connected with earthquakes. The work is not of regional importance only, as in many respects the author discloses new methods; the question of the causes of Finland's earthquakes is examined with special elucidation.--W. Ayvazoglou.

(210) BODENERSCHÜTTERUNGEN, GEOPHYSIK UND INGENIEURGEOLOGIE

(GROUND VIBRATION, GEOPHYSICS, AND ENGINEERING GEOLOGY)

By Walter Kranz

Zeitschrift für Praktische Geologie, Halle (Salle), vol. 39, No. 3, 1931, pp. 38-40.

The author mentions that although there exists an extensive special literature on the use of practical geology for the technique of engineering in earthquake regions, the cooperation of geologists and engineers is not sufficient.

After a brief discussion of the necessity of constructing earthquake-proof buildings, Kranz concludes that, although no technical guarantee can be given against strong dislocations of the earth's crust during earthquakes, most of the damages and losses caused by natural and artificial earthquakes may be prevented by calculation and measurement in technical construction by close cooperation of geophysicists, geologists, and engineers.--W. Ayvazoglou.

(211) MÉTHODE SEISMIQUE DE PROSPECTION DU SOUS-SOL

(SEISMIC METHOD OF PROSPECTING THE SUBSOIL)

Editorial Note

L'Écho des Mines et de la Métallurgie, Paris, vol. 59, No. 3061, 1931, pp. 238-289.

This paper is an extract from Ch. Maurin's work, L'étude du sous-sol par les méthodes géophysiques.

Principles of seismic method are discussed. Acoustic, geothermal, and radioactive methods are mentioned. In conclusion, the author expresses a general desire for the creation, by the cooperation of all engaged in geophysical prospecting, of a geophysical atlas.--W. Ayvazoglou.

(212) NOTE ON THE MECHANISM OF THE NORTH IZU EARTHQUAKE OF NOVEMBER 26, 1930, IN JAPAN

By S. Fujiwhara and T. Takayama

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 131-137.

This is the preliminary note on the mechanism of a destructive earthquake which occurred on November 26, 1930, over North Izu in Japan. There appeared three or four systems of faults on this occasion, as shown in a figure At first sight they are too complicated to be explained in any simple way. By a model experiment, however, the authors found that such complicated fault systems can quite naturally be produced by simple horizontal compressive stress On assuming such stresses as existing in the actual case, the authors have succeeded in explaining the principal facts actually observed.--Author's abstract.

(213) À PROPOS D'UNE ONDE LONGUE DANS LA PREMIÈRE PHASE DE QUELQUES SEISMOGRAMMES

(CONCERNING ONE LONG WAVE APPEARING IN THE FIRST PHASE OF SOME SEISMOGRAMS)

By O. Somville

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 247-251.

This paper continues an article published by the author in Gerlands Beiträge zur Geophysik, vol. 27, No. 3-4, 1930 (see Geophys. Abs. 21, p. 9).

Since the publication of the first article Somville has obtained new observations on the PL-wave showing the data for the propagation of this wave beyond 1,400 kilometers. These data obtained by new observations are given in a table.

Another table shows the times of propagation for distances up to 2,400 kilometers.--W. Ayvazoglou.

(214) COLLECTION OF ARTICLES ON THE THEORY OF THE SEISMIC METHOD OF GEOLOGICAL PROSPECTING (IN RUSSIAN)

By P. T. Sokolov

Transactions of the Geological and Prospecting Service of the U.S.S.R., Leningrad, No. 17, 1931, 72 pp.

This pamphlet consists of a series of articles on seismic method of prospecting showing the results of Sokolov's work carried out during 1929 and 1930.

The following four problems are discussed:

1. Resolution of the hodograph function into series.

2. The methods for calculating the hodographs of waves caused by explosion.

3. Some suggestions concerning the theory of seismic prospecting.

4. Application of the seismic method to the measurement of the deviation of boreholes.

A definition of a hodograph is given as follows:

Based on the attainments of the present time seismic investigations, two quantities, mutually connected one with another, may be obtained in a simple and accurate way from the experiments. These two quantities are (a) the distance of the epicenter of the earthquake from the point of the outlet of the seismic wave at the surface of the earth, calculated along the great circle of the globe, and (b) the time of propagation of the wave from the epicenter to the outlet. The functional relationship of these two quantities is the "hodograph" and is represented symbolically by $T = T(\triangle)$, in which T is the time and $\triangle$ the distance of the epicenter from the outlet.

In the first article the author examines the general properties of a hodograph and the relationship of its coefficients to the elastic properties of the medium.

The second article deals with the methods of calculating the function of the hodograph. Two fundamental methods are compared: (1) the method of algebraic calculation from the velocities of waves in the environments under investigation, and (2) the method of trigonometric analysis of the optical angles of refraction and complete inner reflexion. The author is inclined to be in favor of the second method by reason of the ease of the calculations, the simplicity of the hodograph formulas and the convenience of interpretation. The author illustrates his conclusions by calculating hodographs for three beds with the boundaries inclined to one another.

In the third article the author discusses the problems of systems for carrying out the survey and of methods for combining the seismic data obtained for various profiles. This problem is considered to be important as, in order to obtain detailed and accurate results it is necessary to unite the single profiles, in some way, into one complete picture, thus introducing instead of seismic profiles one "seismic field."

In the fourth article the author, taking as a basis M. Malamphy's article, A Seismic Method of Determining the Deviation of Dull Holes (see Geophys. Abs. No. 4, p. 10), makes an attempt to justify the theory of the application of the seismic method to the measurement of the deviation of boreholes.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(215) VORFÜHRUNG UND ERLÄUTERUNG EINES NEUEN MESSGERÄTS ZUR DIREKTEN AUSMESSUNG VON WIRBELSTROM FELDERN BEI GEOELEKTRISCHEN UNTERSUCHUNGE

(PRESENTATION AND EXPLANATION OF A NEW MEASURING APPARATUS FOR THE DIRECT MEASUREMENT OF EDDY-CURRENT FIELDS DURING GEOELECTRICAL INVESTIGATIONS)

By P. Hülsenbeck

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 82, No. 9, 1930, p. 639.

A brief explanation of the new measuring apparatus was given at a meeting of the German Geological Society held on August 9, 1930. Photographic pictures of a series of results of measurements were presented, and it was shown how the deposits of better conductivity could be exactly distinguished, entirely independent of the position of these deposits with regard to the electrodes. Deposits with better conductivity produced eddy-current fields which were caught independently during the measurement. The difference in the pictures in case of different conductivity, depth, and thickness of the deposits was shown. It was explained how the voltage curve produced during a circular measurement was recorded by the measuring apparatus. The instrument is fixed inside of a water-tight box; all its movable parts can be manipulated from the outside so that measurements can be carried out also during a rain. By introducing the compensator into the box all the electrical connections are established automatically. The compensator is also provided with a water-tight tablet in which notes can be written. It was shown how easily the measuring apparatus can be operated.--W. Ayvazoglou.

(216) ÜBER GRÖSSE UND TIEFENWIRKUNG DER KAPAZITIVEN BEEINFLUSSUNG EINES LEITERS DURCH EINE DISHOMOGENITÄT DES UNTERGRÜNDES. EIN REGISTRIERENDES MESSGERÄT

(ON THE VALUE AND DEPTH EFFECT OF THE CAPACITY INFLUENCE UPON A CONDUCTOR CAUSED BY A HETEROGENEITY IN THE SUBSOIL. A RECORDING MEASURING APPARATUS)

By W. Stern

Zeitschrift fur Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 166-174.

The value and sign of the change of capacity of a linear cylindrical conductor as a function of the distance from the heterogeneous body of electrical conductivity or the dielectric constant of its surroundings is examined in an experimental way. A recording measuring apparatus, developed for this purpose, by which a change of capacity equal to as much as $\pm 10^{-4}$ can be obtained, is described in detail.

It can be shown that the theoretical relationship which so far has formed the basis for the estimation does not satisfy the true conditions. An exact mathematical expression for the law on which the diagrams obtained are based has, of course, not been found so far. The maximum depth effect was established at 1 1/2 length of the conductor, thus can be considered to be about 150 meters.--Author's abstract translated by W. Ayvazoglou.

(217) DIE GLEICHZEITIGE ÜBERTRAGUNG VERSCHIEDENER SIGNALZEICHEN MIT EINEM EINFACHSENDER UND-EMPFANGER

(SIMULTANEOUS TRANSMISSION OF DIFFERENT SIGNALS WITH ONE SINGLE-SENDER AND SINGLE-RECEIVER)

By J. N. Hummel and H. Witte

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 175-182.

The authors examine two connections by which a simultaneous transmission and registration by wireless of two different types of signals, independent one from another, is possible.

The article is divided in the following parts:

1. Definition of the problem (Problem-stellung).

2. Scheme of connection for overlapping receiving (Überlagerungsempfang).

3. Scheme of connection for receiving the current impulse (Stromstossempfang).

The scheme of sending and receiving arrangement, as well as the registrations of the signals are shown in figures.--W. Ayvazoglou.

(218) THEORETISCHE GRUNDLAGEN FÜR DIE ERFORSCHUNG DES ERDINNERN MITTELS GLEICHSTROM

(THEORETICAL FOUNDATION FOR INVESTIGATION OF THE INTERIOR OF THE EARTH BY MEANS OF DIRECT CURRENT)

By J. N. Hummel

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 182-190.

Taking into consideration that some methods used in applied geophysics for the discovery of ore deposits and the study of the tectonics of the uppermost layers may also be applied to scientific research of the physics of the body of the earth and especially because it has recently become possible to investigate by geoelectric methods the vertical change of the electrical conductivity at considerable depths, the author expresses the hope that electrical methods, after being developed further, may be applied for obtaining information on the interior of the earth.

In this article Hummel gives formulas for the measurement of the apparent specific resistance, pointing out that in case of investigation of great depths the curvature of the earth must be taken into consideration, and calculates the differences in values from those applied for plane surfaces.--W. Ayvazoglou.

(219) LA MÉTHODE DE LA CARTE DES RÉSISTIVITÉS ET SES APPLICATIONS PRATIQUES

(THE METHOD OF THE GROUND RESISTIVITY MAP AND ITS PRACTICAL APPLICATION)

By C. and M. Schlumberger

Annales des Mines, Paris, vol. 18, No. 9, 1930, pp. 97-124.

This article was presented by the authors at the International Congress of Mining, Metallurgy and Applied Geology held in Liège in June, 1930.

The article was published in the English language in the Canadian Mining and Metallurgical Bulletin 226, February, 1931, pp. 271-297 (see Geophys. Abs. 23, p. 73).--W. Ayvazoglou.

(220) ÜBER DIE BEZIEHUNGEN ZWISCHEN STÖRUNGEN DES KURZWELLENEMPFANGES UND DEN ERDMAGNETISCHEN STÖRUNGEN

(ON THE RELATIONSHIP BETWEEN THE DISTURBANCES OF THE SHORT-WAVE RECEPTION AND THE EARTHMAGNETIC DISTURBANCES)

By H. Mögel

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 207-212.

In this report Mögel shows, based on practical work, by what means of short-wave technique it is now possible to investigate, by making systematic experiments, the changes of the state of the Kennelly-Heaviside layer. After the report, means were discussed for attaining systematic cooperation in collecting results of observations carried out by the Transradio-Empfangsanlage Geltow near Potsdam and the observatory in Potsdam. The following two main questions were discussed in the report:

1. Proof of change of state of Kennelly-Heaviside layer by studying short-wave phenomena in case of normal variations, as well as in case of disturbances.

2. Observation of short-wave reception disturbances in the Transradio's receiving station across the ocean in connection with magnetic disturbances.

Five figures are added.--W. Ayvazoglou.

(221) DALL' UTILIZZAZIONE DEL RAPPORTO DELLE DISTRIBUZIONI DEI CAMPI POTENZIALE E ELETTROMAGNETICO ALLA DETERMINAZIONE DELLE CARATTERISTICHE DI PROFONDITA E POTENZA DEI GIACIMENTI NEI RELIEVI GEOELETTRICI

(ON THE USE OF THE RELATION OF THE DISTRIBUTION BETWEEN THE POTENTIAL AND ELECTROMAGNETIC FIELDS FOR THE DETERMINATION OF THE DEPTH AND POTENTIAL OF MINERAL LAYERS BY ELECTRICAL PROSPECTION)

By A. Belluigi

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 241-254.

In problems where the calculation of the depths of mineral layers is involved by electrical prospection, the first difficulties are encountered in ascertaining the planimetric dimensions of the layers themselves.

Even if it is true that the solutions which one is able to arrive at are not always perfectly correct, it is nevertheless possible to give solutions which are more or less correct.

In paragraphs 1, 2, and 3 the author illustrates the use of the relation of the distribution between potential and electromagnetic fields, especially fields with a nonelliptical structure.

The calculation of the depth can be carried out by the use of Biot-Savart's formula.--Author's abstract.

(222) ELEKTROGEOPHYSIKALISCHE FELDMESSUNGEN MIT NIEDERFREQUENTEM WECHSELSTROM

(ELECTRO-GEOPHYSICAL FIELD MEASUREMENTS WITH LOW FREQUENCY ALTERNATING CURRENT)

By Theo. Diekmann

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 255-285.

The author describes the carrying out in a Devonian schistous region of a quantitative measurement of the distribution of intensity of a magnetic field interconnected with a low-frequency short-circuit earth current. The vertical component (H_z) of the magnetic field, the horizontal component (H_x) parallel to the line connecting the earth electrodes, and (H_y) perpendicular to this line, as well as the direction of the resulting magnetic vectors, were measured.

Diagrams of the distribution of the components resulting from the measurement of the inclination of the resulting vector and of the angle formed by the horizontal component of the magnetic field with the striking of the rock beds are given for a central line perpendicular to the line connecting the electrodes, which crosses the synclinal fold shown in section.

The distribution of the intensity of the magnetic field of the leading-in wire for various positions of the electrodes, as well as for any line running in a mountainous region, is shown in a series of tables. After the elimination of the magnetic field of the leading-in wire and after the introduction of a fundamental system, depending on the topography of the region, the curves of the distribution of intensity are found; they can serve as a basis for the evaluation because the eddy currents induced by the leading-in wire and the secondary currents induced by the primary field can be disregarded in making measurement with low-frequency alternating current.

The diagrams given in Figures 15, 16, and 17 (corresponding to Figures 5, 6, and 7) which show in addition to a magnetic field rotated in the H_x H_y plane, an inverted direction of the vertical component, H_z, illustrate the deformation of the disturbing field caused by the geological structure of the investigated region.— Author's abstract translated by W. Ayvazoglou.

(223) INTENSITÄTSGRADIENTEN BEI ELEKTRISCHEN AUFSCHLUSSVERFAHREN

(INTENSITY GRADIENTS IN THE ELECTRICAL METHOD OF EXPLORATION)

By Anton Graf

rgänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 286-292.

Formulas for the intensity gradients of the magnetic alternating ield artificially established by electrodes and ring senders are calculated, nd attention is drawn to the advantage of the measurement of this value.--uthor's abstract.

(224) PRINCIPLES OF THE SWEDISH GEOELECTRICAL METHODS

By Karl Sundberg

rgänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 298-361.

This paper describes the theoretical principles upon which the wedish geoelectrical methods are based and gives a summary of the most importnt practical results.

After a short account of the history of geophysical prospecting there ollows a theoretical treatment of the electrical properties of the earth's rust, showing that content and composition of impregnated waters determine the lectrical conductivity of rocks.

The geoelectrical methods are classified as potential methods, lectromagnetic methods, and inductive methods, and the theory of each group of ethods is treated. The importance of Lord Kelvin's theory of images for the omprehension of the potential methods is emphasized by several examples. The ollowing two cases referring to inductive methods are fully treated matheatically:

1. Cylindrical conductor in homogeneous field, the axis of the ylinder being parallel to the field.

2. Horizontal layers with infinite horizontal extension. Principle s well as theory for electromagnetic methods constitutes a combination of otential and inductive methods. Numerous results of small-scale investigations llustrate the theoretical conclusions.

The influence of the magnetic properties is briefly treated.

The arrangements for the investigation of the electric and magnetic ield are described and, finally, some practical results are briefly referred o, such as the discovery of the Boliden ore and other deposits in northern

Sweden, also deposits at Buchans, New Foundland, at Britannia, Canada, at Questa, U.S.A., and on Billiton, East Indies, as well as results of structural surveys in the Vienna Basin, Germany, and the United States of America.--Author's abstract.

(225) A TWO-DIMENSIONAL BOUNDARY VALUE PROBLEM FOR THE TRANSMISSION OF ALTERNATING CURRENTS THROUGH A SEMI-INFINITE HETEROGENEOUS CONDUCTING MEDIUM

By Herbert P. Evans

The Physical Review, New York, vol. 36, No. 10, 1931, pp. 1579-1589.

In this paper an infinitely long conductor parallel to the surface of a semi-infinite conducting medium is considered. The medium is supposed to consist of an upper stratum of uniform conductivity σ_1, and having elsewhere a uniform conductivity σ_2. The conductor is supposed to carry an alternating current for which the conducting medium forms the return path. The problem und consideration is that of determining the field vectors throughout space, subjec to the condition that the frequency is sufficiently low that displacement currents may be neglected. This problem has been solved by Haberland by the case of a sufficiently thin stratum, this limitation arising through the use of approximate boundary conditions. A solution has also been given by Carson for the case of a homogeneous medium. The present treatment utilizes exact boundar conditions and permits the stratum to be of any thickness. The boundary conditions are formulated for a function ϕ which satisfied the wave equation throughout space. By means of the conditions which must hold at the surface of the conductor and at the two faces of the stratum, together with the conditions at infinity, the function ϕ may be expressed in terms of an infinite integral from which the field vectors are derivable. This integral is expanded into a convergent series of simpler integrals which are given physical interpretation.--Author's abstract.

5. RADIOACTIVE METHODS

(226) NEUERE UNTERSUCHUNGEN ÜBER HÖHENSTRAHLUNG

(NEW INVESTIGATIONS ON PENETRATING RADIATION)

By Werner Kolhörster

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 199-207.

This is a report delivered by Kolhörster at the meeting of the German Geophysical Association, held from September 11 to 14, 1930, in Potsdam, on the results of the research on penetrating radiation carried out during the last three years ending September, 1930.

The following items were discussed:

Instrumental improvements.
Problems of penetrating radiation (Höhenstrahlung)
Intensity measurments at various latitudes.
Intensity measurements at various altitudes.
Aperiodical intensity variations.
Intensity variations.
Periodical intensity variations.

Scientists working on the investigations of penetrating radiation and he results obtained by them are mentioned.--W. Ayvazoglou.

(227) GEGENFELDUNTERSUCHUNGEN UND BEWEGLICHKEITSMESSUNG KLEINER JONEN

(REACTION-FIELD INVESTIGATIONS AND MEASUREMENT OF THE MOBILITY OF SMALL IONS)

By T. Scholz

Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 226-238.

In one of his previous publications (Concerning the Method of ounting Ions in the Free-Air; see Geophys. Abs. 26) Yo Itiwara proved the xistence of a "Gegenfeld" in the Langevin apparatus. It was desirable to stablish whether the Gerdien and Ebert apparatuses also have such a "Gegenfeld." easurements carried out on this subject at the Meteorological Observatory in otsdam proved that this "Gegenfeld" existed and caused big error in the determination of the number of small ions. This error could be diminished by using rounded cylinders suspended inside of the condensers.

A strange behavior of the curves obtained from the measurements has een established; this probably may be used for the determination of the obility of the small ions in an easier and more correct way than it was done reviously.--Author's abstract.

(228) ÜBER DIE KONDENSATION AN VERSCHIEDENEN GROSSEN KONDENSATIONSKERNEN UND ÜBER DIE BESTIMMUNG IHRER ANZAHL

(ON THE CONDENSATION AT VARIOUS LARGE CONDENSATION NUCLEI AND ON THE DETERMINATION OF THEIR NUMBER)

By Hilding Köhler

erlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 168-186.

Based on new investigations concerning the atmospheric ionization nd the equilibrium of ionization in the atmosphere, the author brings up the uestion whether the number of nuclei obtained with Aitken's dustcounter is vidently correct. Thermodynamical considerations as well as experiences of he last years prove that this number is questionable.

Some meteorological phenomena are given as a proof of the investigations. These are:

1. A discontinuity of temperature gradient under or in the lower layers of a newly formed cloud.

2. The coexistence of layers of clouds at different altitudes.

3. An abrupt decrease of the atmospheric permeability before the formation of a layer of clouds.

4. The presence of nuclei in fog.

5. A decrease of concentration of chlorine in hoarfrost (Nebelfrost) with the altitude.—Author's abstract.

6. GEOTHERMAL METHODS

(229) GEOTHERMIC MEASUREMENTS NEAR SURFACE

By A. G. R. Whitehouse

The Colliery Guardian, London, vol. 142, No. 3655, 1931, pp. 210-211.

The object of the present observations was to study the relation of surface air temperature to earth temperature at depths up to 30 feet, and to examine the possibility of a more reliable datum for strata-temperature calculations.

The observations were made at Edgbaston in the grounds of the University of Birmingham at a point 453 feet above Ordnance Datum. The earth thermometers at depths of 1, 4, and 7 feet were in gravel, the 30-foot earth thermometer being in soft sandstone.

In Tables I and II are shown: Air and earth temperatures, annual means for the six years, 1924-1929; and annual ranges of temperature of the thermometers, respectively.

From the results of this investigation the author shows that change in mean earth temperature, with increasing depth near the surface, may be distinctly erratic, and that mean air temperature shows no general relationship to mean earth temperature near the surface. The author concludes that, therefore, the only practical datum in this country for calculations of geothermic gradient is the mean air temperature at the surface taken over a long range of years, and that this datum is at the best a very rough one.—W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(230) ZUR KLÄRUNG TEKTONISCHER EINZELFRAGEN IM RHEINGEBIET MIT HILFE GEOPHYSIKALISCHER METHODEN

CONTRIBUTION TO THE EXPLANATION OF PARTICULAR TECTONIC QUESTIONS IN THE RHINELAND WITH THE AID OF GEOPHYSICAL METHODS)

By R. Reichenbach

eitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 82, No. 9, 1930, p. 633.

This is a brief report delivered by Reichenbach during the General eeting of the German Geological Society held in Coblery from August 6 to 9, 930.

He describes the results of three geophysical investigations carried ut in the Rhineland.

1. Gravimetric measurements carried out in the Oberrhein-talgraben, o the south of Darmstadt, with the purpose of establishing the position of he border-faults and an approximate determination of the depth of the Graben.

2. Seismic measurements carried out in the Niederrheinischen Bucht etween Rövenich and Liblar. Based on the results of a seismic profile the epth of the primitive rocks has been established at many places. The greatst depth, about 900 meters, has been reached near Liblar.

3. Radioactive measurements carried out near Hennef on the Sieg stablished and proved the position of a fault and of two ore lodes, the xistence of which was already known.

The author concludes that the use of geophysical investigations ay serve not only mining but also pure geology, as various problems may be xplained by them.—W. Ayvazoglou.

(231) PLUMBING THE DEPTHS OF THE EARTH

By Kirtley F. Mather

Scientific Monthly, New York, February, 1931, pp. 165-168.

Plumbing the depths of the earth is a task of the greatest practical s well as scientific necessity, as many of the most fundamental questions, ncluding the discovery of most valuable stores of petroleum and ore, can be nswered only when the nature of the deeper interior of the earth is known. brief explanation how seismic waves may serve for the determination of the lasticity and density of the material encountered by them is given.

Methods of geophysical prospecting (seismic, gravitational, magnetic) serving for plumbing the depths of the earth are discussed in general.--W. Ayvazoglou.

(232) GEOPHYSICAL SURVEYS

Editorial Note

Science, Philadelphia, vol. 73, No. 1893, 1931, pp. 333-384.

A report is given of a special exhibition of apparatus and equipment used in geophysical surveys opened in the Science Museum, South Kensingto London.

The exhibition begins with illustrating general magnetic principles, through specimens of William Gilbert's "terrolla," or circular loadstone of data about 1600, to the most complicated present-time instruments.

Progress in gravitational and seismic methods of prospecting is shown in two other sections of the exhibition.--W. Ayvazoglou.

(233) GEOPHYSICS APPLIED TO MINING

By James Boyd

The Colorado School of Mines Magazine, Golden, vol. 21, No. 5, 1931, pp. 18 an 38-39.

After a brief introduction in which the author points out the necessity of close cooperation between the geologist and the geophysicist for obtaining successful results from a geophysical survey, the different methods of geophysical prospecting (gravitational, seismic, thermal, radioactive, magneti and electrical) and their advantages and disadvantages for various cases are discussed.--W. Ayvazoglou.

(234) PETROLEUM GEOPHYSICISTS NOW HAVE NATIONAL ORGANIZATION

By John F. Weinzierl

The Oil Weekly, Houston, Texas, vol. 61, No. 3, 1931, p. 60.

The Society of Petroleum Geophysicists, of which Dr. Donald C. Barton, Houston, is the president, came into being on May 20, 1930. Its object is to build up a reference library accessible to members and to serve as a place where the developments in instruments and the advancements in interpretive methods are to be discussed and criticized.

In 1930 the society published its first collection of papers, bound under a cover having the following title: The Society of Petroleum Geophysicist Publication of Papers Presented in 1930.--W. Ayvazoglou.

9. NEW BOOKS

(235) Peters, Leo J., and Bardeen, J. The solution of some theoretical problems which arise in electrical methods of geophysical exploration. Bulletin of the University of Wisconsin Engineering Experiment Station Series, No. 71, 85 pp., Madison, 1930. Price, 75 cents. The bulletin is illustrated with figures and graphs.

(236) Williams, Samuel Robinson. Magnetic phenomena. McGraw-Hill Book Co., New York, 1931, XXII and 230 pages. In the first chapter, Magnetomagnetics, dealing with the magnetic properties of substances, are discussed the definitions and laws and the mathematical and physical conceptions pertaining to magnetic properties, as well as the instruments and methods by which these properties are determined. The succeeding chapters on magnetomechanics, magnetoacoustics, magnetoelectrics, magnetothermics, magneto-optics, cosmical magnetism and magnetic theories and facts, discuss the effect of the magnetic properties upon other properties of substances.

10 PATENTS

1. GRAVITATIONAL METHODS

(237) GRAVITY-DETERMINING DEVICE

Richard Hammer, Pittsburgh, Pa.

United States patent 1,796,150 Patented March 10, 1931.

This invention relates to apparatus for determining variations in the force of gravity including a mass, means for mounting the mass for movement toward and away from the earth in response to change in gravity force, means for generating an alternating current of a predetermined high frequency, including means for varying such frequency by the movement of the mass, and means for measuring the frequency as varied.

Claims allowed - 1.

3. SEISMIC METHODS

(238) METHOD OF RECORDING SEISMIC WAVES

Henry Gordon Taylor, Beaumont, Tex.
Assignor to Geophysical Exploration Co. of Beaumont,
Texas, a corporation of Delaware.

United States patent 1,799,398. Patented Apr. 7, 1931.

The invention relates to a method for ascertaining the presence, depth, shape, and disposition of subsurface strata and other geologic structure.

The general object of this invention consists of providing a method by which a reflected wave is more strongly recorded on a seismogram, and by which other waves are partly or wholly eliminated from the seismogram, making it thereby possible to measure with certainty the time required for an artificially created seismic wave to travel from the surface of the earth down to a reflecting discontinuity and back to the surface, from which data the distance to the reflecting discontinuity may be computed.

Claims allowed - 25.

4. ELECTRICAL METHODS

(239) APPARATUS FOR USE IN DISCOVERING AND DETERMINING OREBODIES

Etienne Samuel Bieler and Horace George Isbister Watson,
of Montreal, Quebec, Canada.

United States patent 1,794,666 Patented March 3, 1931.

The principal feature of this invention is the provision of two flat coils of wire permanently fixed at right angles to each other, but which may be tilted and turned in any desired direction so as to obtain the desired information relative to the location of any orebody in the vicinity.

Claims allowed - 3.

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[2] - Senior physicist, U. S. Bureau of Mines.

This information circular contains abstracts by W. Ayvazoglou from original German patents concerning electrical methods of geophysical prospecting only. All patents issued since 1904 are considered.

Abstracts from German patents concerning other methods of geophysical prospecting will be published in special issues of Geophysical Abstracts appearing later.

Copies of the patents listed in this circular may be procured from Deutsches Reich, Reichspatentamt, Berlin, Germany.

4. ELECTRICAL METHODS

(240) VERFAHREN ZUR AUFFINDUNG UND BESTIMMUNG VON ERZLAGERN

(METHOD FOR DISCOVERING AND DETERMINING ORE DEPOSITS)

The Electrical Ore Finding Co., Ltd.,
of London

152,519 Patent issued July 5, 1904.

This invention relates to a method for discovering ore and other mineral deposits. It is characterized by the possibility of determining the property and the position of the deposit by means of sound produced in a telephone receiver inserted between two portable electrodes and by which a contact with the surface of the earth is established, while the variable electric current impulses are sent through the ground from an induction coil by means of another pair of portable electrodes.

The whole arrangement consists of (1) an induction coil, (2) a telephone-receiver, and (3) four electrodes for the establishment of earth connections.

Claims allowed - 1.

(241) VERFAHREN ZUR SYSTEMATISCHEN ERFORSCHUNG DES ERDINNERN GRÖSSERER GEBIETE MITTELS ELEKTRISCHER WELLEN

(METHOD OF SYSTEMATIC EXPLORATION OF THE SUBSOIL OVER LARGE AREAS BY MEANS OF ELECTRICAL WAVES)

Dr. Gotthelf Leimbach and Dr. Heinrich Löwy
of Göttingen

237,944 Patent issued Sept. 14, 1911.

The patent discloses a method for locating hidden ore deposits by the erection on the area to be explored (level country, mountains, islands) of antennae by which the electrical waves are emitted, or received. On a level terrain about 200 meters deep holes are drilled in which the antennae ires are inserted. In mountainous regions the antennae are erected at the oot of mountains. In case of the exploration of islands the antennae wires re sunk in the water from ships.

Claims allowed - 1.

(242) VERFAHREN ZUM NACHWEIS UNTERIRDISCHER ERZLAGER ODER VON GRUNDWASSER MITTELS ELEKTRISCHER WELLEN

(METHOD FOR DETERMINING SUBTERRANEAN ORE DEPOSITS OR UNDERGROUND WATER BY MEANS OF ELECTRICAL WAVES)

Dr. Heinrich Löwy and Dr. Gotthelf Leimbach
of Göttingen)

46,836 Patent issued May 11, 1912.

The method described in this patent consists of an arrangement by hich electrical waves are emitted from the antenna of a sending system established on the surface of the ground. After the reflexion of these waves from he subterranean body the latter is disclosed by the receiving station, also rovided with an antenna.

Claims allowed - 1.

(243) VERFAHREN ZUR ERFORSCHUNG VON GESTEINSSCHICHTEN INNERHALB VON BERGWERKEN

(METHOD OF EXPLORATION OF ROCK-LAYERS WITHIN MINES)

Dr. Heinrich Löwy of Göttingen

54,478 Patent issued Dec. 6, 1912.

This patent discloses a method for exploration of rock-layers within he mines by producing inside of drifts and boreholes electrical resonance urrents and measuring there their capacity (frequency) and damping.

Claims allowed - 1.

(244) VERFAHREN ZUM NACHWEIS UNTERIRDISCHER ERZLAGER UND GRUNDWASSERSPIEGEL MITTELS ELEKTRISCHER WELLEN

(METHOD FOR DETERMINING SUBTERRANEAN ORE DEPOSITS AND THE LEVEL OF UNDERGROUND WATER BY MEANS OF ELECTRICAL WAVES)

Dr. Heinrich Löwy of Göttingen

54,517 Patent issued Dec. 6, 1912.

According to this patent, subterranean ore deposits and the level of nderground water may be disclosed by observation of the interference, in a receiving antenna stretched horizontally close above the ground, of electrical waves which are produced in a sending antenna running parallel to the receiving antenna, the waves being received partly directly and partly after their reflection from the subterranean ore deposit (or from the level of the ground water).

Claims allowed - 1.

(245) VERFAHREN ZUR BESTIMMUNG DER BESCHAFFENHEIT DES ERDBODENS MITTELS ELEKTRIZITÄT

(METHOD FOR DETERMINING THE CHARACTER OF THE SOIL BY MEANS OF ELECTRICITY)

Conrad Schlumberger of Paris

269,928 Patent issued Feb. 5, 1914.

This patent discloses a method for determining the character of the soil by the following series of steps: (1) Obtaining around two points (electrodes) on the surface of the earth, of equipotential curves and comparing them with equipotential curves determined theoretically for homogeneous ground; (2) determining equipotential curves produced by polarization at the borders of an ore deposit; (3) preventing disturbances caused by earth currents, polarization of electrodes, etc., by periodical commutation of the current flowing between the electrodes; (4) determining the potentials of the ground by means of a movable line in which a galvanometer is included, the line being provided at both ends with metallic rods inserted into a porous receptable filled with a concentrated solution of copper sulphate or a similar salt, in order to establish a nonpolarizing earth-connection; (5) determining the relative potential drop between the equipotential curves with respect to the potential drop between two fixed points on the ground by means of a suitable method of measurement (Wheatstone bridge).

Claims allowed - 5.

(246) VERFAHREN ZUR BESTIMMUNG DER BESCHAFFENHEIT DES ERDBODENS MITTELS ELEKTRIZITÄT

(METHOD FOR DETERMINING THE CHARACTER OF THE SOIL BY MEANS OF ELECTRICITY

Conrad Schlumberger of Paris

272,603 Patent issued April 6, 1914

This is an addition to patent 269,928 concerning the same subject. The method is characterized by determining equipotential curves which result from polarization currents produced by ore deposits and metallic masses hidden in moist ground, without being influenced by artificial sources of current.

Claims allowed - 1.

(247) VERFAHREN ZUR AUFSUCHUNG LEITENDER FLÄCHEN (Z. B. WASSER UND ERZ) MITTELS ELEKTRISCHER WELLEN

(METHOD FOR EXPLORATION CONDUCTING SURFACES (FOR EXAMPLE WATER AND ORE) BY MEANS OF ELECTRIC WAVES)

Dr. Gotthelf Leimbach of Göttingen

73,339 Patent issued April 24, 1914.

The method described is characterized by determining that length of wave by which a sender, provided with one or several antennae running ap- roximately parallel to the conducting surface, shows minimum damping, in hich case one-fourth of the length of the wave or an odd multiple of it is qual to the distance of the antennae from the conducting surface.

(248) VERFAHREN ZUR FESTSTELLUNG DES VERLAUFS VON ERDBOHRUNGEN

(METHOD FOR DETERMINING THE COURSE OF BOREHOLES)

Erforschung des Erdinnern G.m.b.H., Hannover
Geschäftsstelle Göttingen in Göttingen

87,610 Patent issued Sept. 28, 1915.

The method for determining the course of boreholes, described in his patent, is characterized by an arrangement in which the metallic parts hich may be found in the boreholes, especially the metallic tubing of, for xample, two adjacent boreholes, are connected to an alternating current enerator, so that they form the coating of a condenser the dielectric of hich represents the intermediate ground. By measuring and determining the apacity, resistance, and self-induction the distance between the coatings of he condensers, that is, the distance between the two boreholes, is determined.

Claims allowed - 1.

(249) VERFAHREN ZUR ERFORSCHUNG VON GESTEINSCHICHTEN DURCH ELEKTRISCHE MESSUNGEN

(METHOD FOR EXPLORATION OF ROCK LAYERS BY MEANS OF ELECTRICAL MEASUREMENTS)

Erforschung des Erdinnern G.m.b.H., Hannover
Geschäftsstelle Göttingen in Göttingen

87,611 Patent issued Sept. 25, 1915.

This patent disclosed a method for electrical measurements by which the resistance of rock layers is determined with the aid of electrodes, buried in the rock, applying alternating current of suitable frequency

Claims allowed - 1.

(250) VERFAHREN ZUR AUFFINDUNG UNTERIRDISCH ODER VERDECKT VERLEGTER METALLISCHER KABEL ODER ROHRSTRÄNGE MIT HILFE SCHNELLER ELECTRISCHER SCHWINGUNGEN

(METHOD FOR DISCOVERING METALLIC CABLES OR PIPE-LINES BURIED IN THE GROUND OR PLACED UNDER SHELTER BY MEANS OF RAPID ELECTRICAL OSCILLATIONS)

Dr. Max Dieckmann of Gräfeling near Munich

303,912 Patent issued Sept. 29, 1919.

The method is characterized by the transmission, from a generating system to the conductor sought for, of high-frequency energy by means of coupling so that the high-frequency field produced around the conductor can be determined by means of an indicator of which the sensitivity of oscillations is either adjusted or not adjusted.

Claims allowed - 1.

(251) EINRICHTUNG ZUR AUFFINDUNG UNTERIRDISCHER ODER VERDECKT LIEGENDER, GUTLEITENDER GEGENSTÄNDE

(METHOD FOR FINDING SUBTERRANEAN OR SHELTERED OBJECTS OF GOOD CONDUCTIVITY)

Gesellschaft für drahtlose Telegraphie m.b.H. in Berlin

305,574 Patent issued Sept. 9, 1919.

This method is characterized by an oscillating system with a cathodic generator, an induction coil with a strong leakage field connected to it, and an arrangement for noticing the frequency changes of a resonance current which are caused when the induction coil is brought into proximity with the conducting body. Another feature of the invention consists of an arrangement for producing auxiliary oscillations which, combined with the original oscillations, result in an interference sound, so that the frequency change can be perceived either as a sound or as a change of the sound.

Claims allowed - 2.

(252) VERFAHREN UND VORRICHTUNG ZUM NACHWEIS UNTERIRDISCHER ERZLAGER ODER VON GRUNDWASSER MITTELS ELEKTRISCHER SCHWINGUNGEN

(METHOD AND ARRANGEMENT FOR DETERMINING SUBTERRANEAN ORE DEPOSITS OR UNDERGROUND WATER BY MEANS OF ELECTRICAL OSCILLATIONS)

Konstantin Schilowsky of Davos-Dorf, Switzerland

322,040 Patent issued June 19, 1920.

The invention discloses a method by which long waves are emitted over large subterranean areas to great distances in a horizontal direction, s well as in depth, by means of a sending apparatus (for example an antenna ender); the wave energy produced by these waves, after having met an orebody nd being scattered by it, is caught on the surface in the proximity of the eposit by means of portable receiving apparatus, the latter being protected rom the effect of the primary field of the sending apparatus.

The receiving apparatus serving for catching the energy scattered y the orebody consists of closed resonance currents with large-diameter olenoids; these solenoids are protected from the effect of the primary waves mitted by the sender by arranging them so that their area of turn coincides ith the direction of the magnetic vector of the primary waves.

Claims allowed - 2.

(253) EINRICHTUNG ZUR AUFFINDUNG UND FESTSTELLUNG VERBORGENER ODER UNZUGÄNGLICHER METALLE

(METHOD FOR DISCOVERING AND DETERMINING HIDDEN OR INACCESSIBLE METALS)

Dr. Max Reithoffer of Vienna

26,467 Patent issued Sept. 29, 1920.

The method considered in this patent is characterized by mutual conection of resonance coils, traversed by alternating currents of low and high requency, in such a manner that the changes caused by introduction of metallic asses into the electrical or magnetic field of one or two of these coils of he value equal to the induced or the effective ohm's resistance (damping) or f the natural frequency of the coils concerned, result in potential differnces which can be measured or observed by known methods.

Claims allowed - 5.

(254) VORRICHTUNG ZUM ENTDECKEN UND BESTIMMEN DER LAGE VON ERZ-ODER MINERALGÄNGEN AUF ELEKTRISCHEM WEGE

(METHOD FOR DISCOVERING AND DETERMINING THE POSITION OF ORE DEPOSITS AND MINERAL DEPOSITS BY ELECTRICAL METHODS)

Hans Torkel Fredrick Lundberg and Harry Johan Hjalmar Nathorst
of Stockholm

28,835 Patent issued Nov. 8, 1920.

The arrangement disclosed in this patent consists of two pairs of lectrodes; one of them is connected with the source of the current (primary lectrodes) and the other (secondary electrodes, called searching rods) is rovided with a sensitive receiver, for example, a telephone; the secondary lectrodes are brought into connection with the ground at different places etween the primary electrodes. The arrangement of the two primary electrodes or only one of them) is proposed in the form of points lying along a straight line or a curve--for example, in the form of a bare wire placed on the surface of the ground. It is very important that the extension occupied by the electrode (or electrodes) along the surface of the ground be great in comparison with the distance between the electrodes, as only in this case will the equipotential lines be straight lines or elongated curves.

Claims allowed - 1.

(255) VORRICHTUNG ZUM AUFFINDEN VON ELEKTRISCH LEITENDEN, DEM AUGE DURCH NICHTLEITER VERBORGENER KÖRPERN

(METHOD FOR DISCOVERING BODIES CONDUCTING ELECTRICITY, HIDDEN FROM SIGHT BY NONCONDUCTORS)

Ludwig Machts of Marburg, Lahn

330,090 Patent issued Dec. 7, 1920.

The patent discloses a method by which electric waves reflected by bodies conducting electricity are, after reflection, collected by a receiving apparatus. The method is characterized by an arrangement by which the reflected waves are united (similar to light waves) by means of a lens into a picture invisible to the eye; this picture is received automatically by a spiral antenna; the more or less strong induction currents produced in the latter are intensified by means of tubular receivers and intensifying lamps--for example, with the aid of a discharge line running synchronously to the antenna; the luminous discharges are projected upon a film and reproduced on it photographically; conclusions on the distribution of the conducting body can be drawn from the differences in the intensity of brightness of the films.

Claims allowed - 1.

(256) VERFAHREN ZUR FESTSTELLUNG VON ERZ-WASSER-ODER ANDEREN BODENSCHICHTEN MIT EINER VON DER UMGEBUNG ABWEICHENDEN ELEKTRISCHEN LEITFÄHIGKEIT MITTELS ELEKTRISCHER WELLEN

(METHOD FOR DETERMINING, BY MEANS OF ELECTRICAL WAVES, ORE LAYERS, WATER LEVELS AND OTHER SUBTERRANEAN LAYERS, THE ELECTRICAL CONDUCTIVITY OF WHICH IS DIFFERENT FROM THAT OF MATERIALS SURROUNDING THEM)

Eduard Raven of Gelsenkirchen

331,426 Patent issued Jan. 7, 1921.

The patent discloses a method in which the electric waves are emitted from two radio stations through the ground toward a common receiving station; from the sound picture received in the latter the nature and the extension of the disturbing body lying in the path of the waves can be determined.

Claims allowed - 1.

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(257) VERFAHREN ZUR FESTSTELLUNG VON ERZ-WASSER-ODER ANDEREN BODENSCHICHTEN MIT EINER VON DER UMGEBUNG ABWEICHENDEN ELEKTRISCHEN LEITFÄHIGKEIT MITTELS ELEKTRISCHER WELLEN UND REFLEXION DERSELBEN

(METHOD FOR DETERMINING, BY MEANS OF ELECTRICAL WAVES AND REFLECTION, ORE LAYERS, WATER LEVELS AND OTHER SUBTERRANEAN LAYERS THE ELECTRICAL CONDUCTIVITY OF WHICH IS DIFFERENT FROM THAT OF MATERIALS SURROUNDING THEM)

Eduard Raven of Gelsenkirchen

31,427 Patent issued Jan. 7, 1921.

The patent discloses a method in which the electrical waves are mitted from two radio stations through the ground, and the paths of the aves, or their reflections, are determined by means of a receiving station ituated at about an equal distance from the two sending stations and adjusted o the same sound.

Claims allowed - 1.

(258) VERFAHREN ZUR FESTSTELLUNG VON ERZ-WASSER-ODER ANDEREN BODENSCHICHTEN MIT EINER VON DER UMGEBUNG ABWEICHENDEN ELEKTRISCHEN LEITFÄHIGKEIT

(METHOD FOR DETERMINING ORE LAYERS, WATER LEVELS AND OTHER SUBTERRANEAN LAYERS THE ELECTRICAL CONDUCTIVITY OF WHICH IS DIFFERENT FROM THAT OF MATERIALS SURROUNDING THEM)

Eduard Raven of Gelsenkirchen

34,626 Patent issued March 15, 1921.

This patent discloses a method by which the disturbances of an elecric current line field produced in the ground by layers of electrical conuctivity different from that of the surrounding material, as well as the posiion of the disturbing mass, are determined by listening, on the surface of he earth or other accessible place, in a telephone inserted into a movable earching loop or coil. A device provided for amplifying the current--for xample, a cathode tube--is inserted into the searching loop.

Claims allowed - 3.

(259) VERFAHREN ZUM AUFSUCHEN VON EISENERZLAGERN

(METHOD FOR DISCOVERING IRON-ORE DEPOSITS)

Eduard Raven of Gelsenkirchen

44,489 Patent issued Nov. 22, 1921.

The method for discovering iron-ore deposits described in this patent s based on the fact that the earthmagnetic lines of force existing at the places of such deposits influence wire loops or coils (with or without an iron core) moved across the terrain; the weak induction currents thus produced are amplified by a suitable amplifier (for example a cathode-tube amplifier) so that they can be perceived by a telephone or a similar device. The coil is suspended inside of a frame which can be rotated around an axis perpendicular to the axis of the coil.

Claims allowed - 3.

(260) UNPOLARISIERBARE ELEKTRODE ZU ERDFORSCHUNGSZWECKEN

(NONPOLARIZABLE ELECTRODE FOR THE PURPOSES OF GROUND INVESTIGATION)

"Erda" Aktien-Gesellschaft of Göttingen

367,634 Patent issued Jan. 24, 1923.

This patent describes a nonpolarizable electrode used for ground investigation in which the metal electrode which serves as a means for passing of the current is surrounded by a series of solutions of similar or different metallic salts separated one from another by porous walls and having a concentration which approaches by steps the electrolytic concentration of the ground.

Claims allowed - 1.

(261) VERFAHREN ZUR ELEKTRISCHEN ERFORSCHUNG DES ERDINNERN

(METHOD OF ELECTRICAL INVESTIGATION OF THE INTERIOR OF THE EARTH)

Dr. Heinrich Löwy of Vienna

368,079 Patent issued Jan. 31, 1923.

The patent discloses a method of electrical investigation of the interior of the earth by which a large number of measurements can be made in a very short time by flying above the ground in an airplane or airship; the method is characterized by equipping the airship with an earth antenna drawn along the ground during the flight.

Claims allowed - 2.

(262) VORRICHTUNG ZUR AUFSUCHUNG UND LAGEBESTIMMUNG VON MASSEN ABWEICHENDER ELEKTRISCHER LEITFÄHIGKEIT IM ERDBODEN

(ARRANGEMENT FOR DISCOVERING AND DETERMINING THE POSITION OF SUBTERRANEAN MASSES HAVING ANOMALOUS ELECTRICAL CONDUCTIVITY)

"Erda" Gesellschaft für wissenschaftliche Erderforschung
und Dr. Richard Ambronn of Göttingen

72,536 Patent issued March 29, 1923.

The arrangement for discovering and determining the position of subterranean masses having anomalous electrical conductivity is characterized by establishing the distribution of the electrical potential or the equipotential lines along the surface of the earth or along the boreholes by means of flat electrodes disposed on the surface of the earth or lowered into the ground in places suitably situated with respect to the object sought for.

Claims allowed - 1.

(263) VERFAHREN ZUR FESTSTELLUNG DER LAGE ELEKTRISCH LEITENDER FLÄCHEN IN DER ERDE MIT HILFE DER REFLEXION ELEKTRISCHER WELLEN

(METHOD FOR DETERMINING THE POSITION OF SUBTERRANEAN ELECTRICALLY CONDUCTIVE AREAS WITH THE AID OF THE REFLECTION OF ELECTRICAL WAVES)

Gesellschaft für drahtlose Telegraphie m.b.H. in Berlin

77,187 Patent issued June 13, 1923.

The patent discloses a method in which the sender consists of a horizontal antenna and the receiver of a frame antenna rotatable about a horizontal axis; by the latter antenna the angle of incidence of the reflected waves emitted from the conducting area, and therefore also the position of this area, are determined.

Claims allowed - 1.

(264) VERFAHREN ZUR FESSTELLUNG DER TIEFE EINER DAS STROMLINIENFELD STÖRENDEN EINLAGERUNG IN DER ERDE

(METHOD FOR DETERMINING THE DEPTH OF A SUBTERRANEAN DEPOSIT BY WHICH THE CURRENT-LINE FIELD IS DISTURBED)

Gesellschaft für praktische Geophysik, m.b.H. in Freiberg i. B.

77,837 Patent issued June 28, 1923.

The method disclosed in this patent is characterized by an arrangement in which two induction loops or induction coils assigned for the determination of the direction of the lines of force of the field are fixed at different heights from the surface of the ground and are rotated until maximum or minimum induction effect is obtained. For the determination of the intensity difference of the field at the two positions the induction effects obtained in the two coils are compared one with another or determined, according to the zero method, with the aid of a branched part of the primary current working in the opposite direction.

Claims allowed - 1.

(265) VORRICHTUNG ZUR BESTIMMUNG VON RICHTUNG, INTENSITÄT UND POLARISATIONSZUSTAND ELEKTRISCHER WELLEN, INSBESONDERE ZU ERDERFORSCHERUNGSZWECKEN IN BERGWERKEN

(METHOD FOR DETERMINING THE DIRECTION, INTENSITY AND POLARIZATION STATE OF ELECTRICAL WAVES, ESPECIALLY FOR PURPOSES OF THE INVESTIGATION OF THE GROUND IN MINES)

"Erda" Aktien-Gesellschaft of Göttingen

378,224 Patent issued Nov. 16, 1923.

The method described in this patent is characterized by an arrangement in which the receiving system consists of a frame antenna rotatable about a horizontal and a vertical axis connected with a rotatable or oscillating condenser.

Claims allowed - 4.

(266) VERFAHREN ZUR AUFSUCHUNG VON KÖRPERN IM UNTERGRUNDE

(METHOD FOR DISCOVERING BODIES LYING UNDER THE GROUND)

"Erda" Aktein-Gesellschaft in Göttingen

392,158 Patent issued March 17, 1924.

This patent discloses a method for discovering bodies lying under the ground, the electrical conductivity of which is different from that of the material surrounding them, by means of electrical current-line method, equipotential-line method, or similar methods in case there is in the ground another known disturbing deposit the conductivity of which also differs from the material surrounding it. This method is characterized by screening off the known deposit from the field to be investigated by means of one or a series of auxiliary electrodes connected to one or both the field electrodes.

Claims allowed - 2.

(267) VERFAHREN ZUR ERGÄNZUNG VON MESSUNGEN MITTELS EQUIPOTENTIALLINIEN-METHODE FÜR ERDERFORSCHUNGSZWECKE

(METHOD FOR SUPPLEMENTING THE MEASUREMENTS MADE BY MEANS OF EQUIPOTENTIAL LINE METHOD FOR EARTH INVESTIGATION)

"Erda" Aktien-Gesellschaft in Göttingen

2,189 Patent issued March 17, 1924.

The method disclosed in this patent is characterized by an arrange-
ent in which at places of measured potential lines, distributed suitably, the
oltage drop perpendicular to the potential line is measured quantitatively
r relatively and the local current density of the ground is determined in
onnection with the resistance measurements in the closing circuit of the
robe current.

Claims allowed - 1.

(268) VORRICHTUNG ZUM AUFSUCHEN VON MAGNETISCHEN ODER ELEKTRISCH LEITFÄHIGEN STOFFEN

(METHOD FOR DISCOVERING MAGNETIC OR ELECTRICALLY CONDUCTIVE MATERIALS)

"Erda" Aktien-Gesselschaft of Göttingen

2,987 Patent issued March 28, 1924.

The patent describes an arrangement for discovering magnetic or
lectrically conductive materials based on their influence upon the develop-
ent of lines of force in a magnetic direct current field or alternating
urrent field or upon the induction coefficients of coils. The method is
haracterized by an arrangement in which two electromagnetic systems of differ-
nt geometrical shape are in differential connection to each other; these sys-
ems are differently influenced by the distribution of the magnetically or
lectrically conductive masses in space.

Claims allowed - 3.

(269) ANORDNUNG ZUR BESTIMMUNG DER RICHTUNG EINES IN DER ERDE FLIESSENDEN WECHSEL-ODER GLEICHSTROMES

(ARRANGEMENT FOR DETERMINING THE DIRECTION OF AN ALTERNATING OR DIRECT CURRENT FLOWING INSIDE THE EARTH)

Gessellschaft für praktische Geophysik m.b.H. in Freiburg i. B.

3,644 Patent issued April 11, 1924.

This patent discloses an arrangement by which three search electrodes
re connected to three or two coils or current conductors so that the angles of

the coil planes correspond to the angles formed by the lines connecting the three search electrodes; the effect of one coil corresponds to the length of the respective path on the earth, so that the direction of maximum or minimum induction in a rotatable coil or the deviation of a magnet needle shows the direction of the whole alternating or direct current inside the earth.

Claims allowed - 1.

(270) EINRICHTUNG ZUM NACHWEIS VON LEITENDEN KÖRPERN

(ARRANGEMENT FOR DETECTING CONDUCTIVE BODIES)

Rudolf Hans Richter of Leipzig-Gohlis

397,698 Patent issued June 28, 1924.

The investion discloses an arrangement for detecting conductive bodies in which not the main oscillation is observed but an oscillation harmonic to it. This is obtained by superposing an auxiliary oscillation which is harmonic to the fundamental one.

Claims allowed - 3.

(271) EINRICHTUNG ZUM NACHWEIS VON LEITENDEN KÖRPERN

(ARRANGEMENT FOR DETECTING CONDUCTIVE BODIES)

Rudolf Hans Richter of Leipzig-Gohlis

398,267 Patent issued July 5, 1924.

The investion described in this patent relates to a method in which, by means of arrangements between the turns of the coil used, or between the coils and the earth, such a capacity contact is obtained that changes in the effective capacity caused by approaching of human and animal bodies, as well as changes caused by other sources of disturbance, may become very small and practically harmless.

Claims allowed - 3.

(272) VERFAHREN ZUR AUSMESSUNG MAGNETISCHER WECHSELFELDER

(METHOD FOR MEASURING MAGNETIC ALTERNATING FIELDS)

"Erda" Aktien Gesselschaft in Göttingen

400,148 Patent issued Aug. 7, 1924.

In this patent a method for measuring magnetic alternating fields, especially for the purpose of ground investigation, is described, in which the revolving axis of a coil turned around slowly is adjusted so that the variations of the alternating current induced in the coil by the earth currents, hich vary in the field of the lines of force during rotation, disappear.

Claims allowed - 4.

(273) VERFAHREN ZUR ERFORSCHUNG DES ERDINNERN MITTELS EINES VON EINEM LUFTSCHIFF ODER FLUGZEUG ÜBER DEN BODEN GEFÜHRTEN OFFENEN ODER GESCHLOSSENEN SCHWINGUNGSKREISES

(METHOD FOR INVESTIGATING THE SUBSOIT BY MEANS OF AN OPEN OR CLOSED OSCILLATORY CIRCUIT CARRIED ALONG ABOVE THE GROUND BY AN AIRSHIP OR AIRPLANE)

Dr. Heinrich Löwy of Vienna

01,443 Patent issued Sept. 4, 1924.

This patent relates to a method characterized by an arrangement such hat the oscillatory circuit is not drawn along on the ground during the flight ut is secured at a constant distance below the airship or airplane and is hus moved above the ground.

Claims allowed - 2.

(274) SCHALTUNGSANORDNUNG FÜR ERDERFORSCHUNG

(ELECTRICAL CIRCUIT ARRANGEMENTS FOR EARTH INVESTIGATION)

"Erda" Aktien Gesellschaft und Dr. Richard Ambronn of Göttingen

03,213 Patent issued Oct. 12, 1924.

This method of connection for earth investigation by means of elecrical currents is characterized by producing, on an area situated outside f the region to be investigated, a tension field of a form similar to that f the field. The spatial or superficial distribution of the tension with egard to this field is then measured directly or with the aid of a potentioeter inserted in this tension field.

Claims allowed - 2.

(275) VERFAHREN ZUR ELEKTRODYNAMISCHEN ERFORSCHUNG DES ERDINNERN MITTELS DIE ERDSCHICHTEN DURCHSTRAHLENDER, VON TELEPHONEMPFÄNGERN AUFZUFANGENDER ELEKTRISCHER INDUKTIONSSTRÖME

(METHOD FOR ELECTRO-DYNAMIC INVESTIGATION OF THE SUBSOIL BY MEANS OF ELECTRICAL INDUCTION CURRENTS PENETRATING THROUGH THE EARTH-LAYERS AND CAUGHT BY TELEPHONE RECEIVERS)

Nobert Gella of Vienna

03,494 Patent issued Oct. 2, 1924.

The method for investigating the subsoil disclosed in this patent onsists in leaving the receiving station at the same place and moving the transmitter along the borders of the region under investigation, determining the strength of the sound by means of a telephone.

Claims allowed - 2.

(276) EINRICHTUNG ZUM NACHWEIS UND ZUR MESSUNG DES ABSTANDES ELEKTRISCH LEITFÄHIGER MASSEN

(METHOD FOR DETERMINING AND MEASURING THE DISTANCE FROM ELECTRICALLY CONDUCTIVE MASSES)

Dr. Heinrich Löwy of Vienna

403,939 Patent issued Oct. 7, 1924.

The method for determining and measuring the distance from electrically conductive masses described in this patent is characterized by an arrangement in which a transmitter and a receiver are switched off alternatively and with variable frequency by means of a modulation transmitter (Modulationssender The modulation is carried out by alternating current, electrical oscillations, direct current with reduced pulsations, or electrical vibrations.

Claims allowed - 3.

(277) VERFAHREN ZUR RICHTUNGSBESTIMMUNG VON ELEKTROMAGNETISCHEN STRAHLUNGEN, VORZUGSWEISE IN BERGWERKEN

(METHOD FOR DETERMINING THE DIRECTION OF THE ELECTROMAGNETIC RADIATION ESPECIALLY IN MINES)

"Erda" Aktien-Gesellschaft of Göttingen

404,098 Patent issued Oct. 11, 1924.

The method for determining the direction of the electromagnetic radiation described in this patent consists of determining, by means of a frame antenna, the direction of magnetic lines of force produced by two transmitting antennae, located at the same place or at two places close one to another, the magnetic axes of which are perpendicular one to another and also perpendicular to the direction toward the receiving station.

Claims allowed - 3.

(278) EINRICHTUNG ZUM NACHWEIS VON LEITENDEN ODER MAGNETISIERBAREN KÖRPERN

(ARRANGEMENT FOR DETERMINING CONDUCTIVE OR MAGNETIZABLE BODIES)

Rudolf Hermann Heinrich Geffcken and Rudolf Hans Richter
of Leipzig-Gohlis

04,099 Patent issued Oct. 13, 1924.

This patent discloses an arrangement for determining conductive or agnetizable bodies by means of frequency changes which are made perceivable n the form of changes of sound frequency oscillations. The arrangement is characterized by determining the frequency changes of the sound frequency oscillations by working with other oscillations or other systems of oscillations.

Claims allowed - 6.

(279) EINRICHTUNG ZUR AUFSUCHUNG UND BEGRENZUNG ELEKTRISCH LEITENDER RÄUME IN RÄUMEN VON ABWEICHENDER LEITFÄHIGKEIT ODER DIELEKTRIZITÄTSKONSTANTE

(METHOD FOR DETECTING AND DELIMITING ELECTRICALLY CONDUCTIVE SPACES SURROUNDED BY SPACES WITH ANOMALOUS CONDUCTIVITY OR DIELECTRIC CONSTANT)

"Erda" Aktien-Gesellschaft in Göttingen

05,473 Patent issued Nov. 11, 1924.

This patent discloses a method by which electrically conductive spaces surrounded by spaces with anomalous conductivity or dielectric constant are detected and their borders are established by determining the direction and intensity of electrical waves emitted from a fixed place and deflected rom the surface limiting the conductive space and running along suitably ituated lines around the surface sought for.

Claims allowed - 1.

(280) VERFAHREN ZUR UNTERSUCHUNG DER BODENBESCHAFFENHEIT AUF GRUND DER VERTEILUNG DER ELEKTRISCHEN LEITFÄHIGKEIT IM BODEN

(METHOD FOR INVESTIGATION OF THE NATURE OF THE GROUND BASED ON THE DISTRIBUTION OF ELECTRICAL CONDUCTIVITY IN THE SOIL)

"Erda" Aktien-Gesselschaft in Göttingen

406,299 Patent issued Nov. 17, 1924.

The method described in this patent consists in measuring and comparing the variations of the natural magnetic earth field produced by natural earth currents as well as artificial current impulses. The measurements are made at several points, suitably distributed, by means of a magnetometer or adjusted resonance systems.

Claims allowed - 3.

(281) VERFAHREN ZUM FESTSTELLEN VON WASSERANNÄHERUNG BEI VERROHRTEN BOHRUNGEN

(METHOD FOR DETERMINING THE APPROACH OF WATER IN TUBED BOREHOLES)

Gesellschaft für praktische Geophysik, m.b.H. in Freiburg.

407,495 Patent issued Dec. 17, 1924.

The method described in this patent is characterized by an arrangement in which the metallic tubing of a borehole itself forms the capacity of a resonance current; the tubing capacity and its change is measured directly in a known way, either by the measurement of the charge current or the discharge current, or by using a combination with another resonance current according to the well-known method of electrical vibrations; the capacity change of the tubing caused by the approach of water is determined from the change in the rate of vibration of the sound or from the strength of the charge and the discharge current.

Claims allowed - 2.

(282) VORRICHTUNG ZUM ENTSENDEN ELEKTRISCHER STRÖME IN DEN BODEN ZWECKS AUFSUCHUNG UND LAGENBESTIMMUNG VON BODENTEILEN MIT ABWEICHENDER ELEKTRISCHER LEITFÄHIGKEIT

(ARRANGEMENT FOR DISPATCHING ELECTRICAL CURRENTS INTO THE GROUND FOR THE PURPOSE OF DISCOVERING AND DETERMINING THE POSITION OF DEPOSITS WITH ANOMALOUS ELECTRICAL CONDUCTIVITY)

W. Piepmeyer and Co., Kommandit-Gesellschaft in Cassel-Wilhelmshöhe

408,819 Patent issued Jan. 27, 1925.

This patent discloses an arrangement in which insulated electrodes are buried in the ground at a considerable depth. For this a pipe, the inside surface of which is covered with an insulating layer, is driven into the ground. An insulated cable passes through the pipe and is connected with the metallic sharp end of the pipe; the connection with the ground is established through this metallic end which is insulated from the pipe.

Claims allowed - 2.

(283) VERFAHREN ZUM AUFSUCHEN UND ZUR LAGEBESTIMMUNG VON BODENTEILEN MIT ABWEICHENDER ELEKTRISCHER LEITFÄHIGKEIT MIT HILFE IN DEN BODEN GESANDTER ELEKTRISCHER STRÖME

(METHOD FOR DISCOVERING AND DETERMINING THE POSITION OF PARTS OF THE GROUND HAVING ANOMALOUS ELECTRICAL CONDUCTIVITY BY MEANS OF ELECTRICAL CURRENTS DISPATCHED INTO THE GROUND)

W. Pipemeyer and Co., Kommandit-gesellschaft in Cassel-Wilhelmshöhe

15,188 Patent issued June 22, 1925.

The plan of this patent is characterized by measuring the direction nd strength of the magnetic field produced at places above the surface of he ground or those accessible in the subsoil, in such a way that a wire-wound ing, capable of being turned in any position by means of three axes, is conected to a measurement device; for the determination of the direction of the agnetic field first one axis, which at the same time is the diameter of the ing, is brought into such a position that by rotating the ring around this xis the device for measuring the current indicates the absence of a current t any position of the ring; after this the maximum value of the induction is etermined for the position of the ring-plane perpendicular to this position f the axis.

Claims allowed - 2.

(284) VERFAHREN ZUM AUFFINDEN LEITENDER MASSEN IM ERDBODEN DURCH ELEKTRISCHEN WECHSELSTROM, DER AN ZWEI STELLEN DEM BODEN ZUGEFÜHRT WIRD

(METHOD FOR DISCLOSING CONDUCTIVE SUBTERRANEAN MASSES BY MEANS OF ELECTRIC ALTERNATING CURRENT PASSED INTO THE GROUND AT TWO POINTS)

Société Industrielle des Procédés W.-A. Loth in Paris

17,563 Patent issued Aug. 14, 1925.

Determination is made of the earth-currents produced by means of a ine, the ends of which are connected with the ground, by means of their induction-effect upon a coil. The particular properties of the ground are disclosed by the course of the magnetic lines of force. Cardan suspension of the coil characterizes this method. A system of three frames adjusted perpendicularly one to another is used.

Claims allowed - 4.

(285) EINRICHTUNG ZUM NACHWEIS VON LEITENDER ODER MAGNETISCHEN KÖRPERN

(ARRANGEMENT FOR DETERMINING CONDUCTIVE OR MAGNETIC BODIES)

Dr. Rudolf Hermann Heinrich Geffcken and Dr. Rudolf
Hans Richter of Leipzig-Gohlis

417,834 Patent issued Sept. 19, 1925.

The arrangement for determining conductive or magnetic bodies based on their influence upon the vibration conditions of a tubular generator is characterized by determining the changes of the anode direct current or grid direct current of the generator tubes caused by this influence.

Claims allowed - 5.

(286) VERFAHREN ZUR ELEKTRISCHEN UNTERSUCHUNG DES UNDERGRUNDES

(METHOD FOR ELECTRICAL INVESTIGATION OF THE SUBSOIL)

"Erda" Aktien-Gesselschaft of Göttingen

422,348 Patent issued Nov. 28, 1925.

High-frequency alternating currents are passed into the ground at two or more suitable selected points and the intensity, direction, and the polarization conditions of these alternating currents, at points suitably distributed, are determined by means of inclosing in the electromagnetic alternating field produced by the current-receiving systems for high-frequency oscillations.

Claims allowed - 2.

(287) EINRICHTUNG ZUM ELEKTROAVIATISCHEN NACHWEIS UND ZUR MESSUNG DES ABSTANDES ELEKTRISCH LEITFAHIGER MASSEN

(ARRANGEMENT FOR ELECTRO-AVIATIC INVESTIGATION AND FOR MEASURING DISTANCES FROM ELECTRICALLY CONDUCTIVE MASSES)

Dr. Heinrich Löwy of Berlin

425,050 Patent issued Feb. 11, 1926.

The arrangement described in this patent consists of connecting two or more airships by metallic wires serving as an antenna.

Claims allowed - 4.

(288) EINRICHTUNG ZUM NACHWEIS VON LEITENDEN KÖRPERN

(ARRANGEMENT FOR DETERMINING CONDUCTIVE BODIES)

Dr. Rudolf Hermann Heinrich Geffcken and
Dr. Rudolf Hans Richter
of Leipzig-Gohlis.

26,795 Patent issued March 17, 1926.

According to the arrangement described in this patent the determin-
tion of conductive bodies is obtained by means of several loosely coupled
ystems, capable of oscillating and adjusted to the exciting frequency in such
manner that the oscillation produced in each system remains, with regard to
he inducing oscillation, in the region of sharp phase change; an arrangement
or determining the shifts of the phase conditions of the systems is added.

Claims allowed - 3.

(289) EINRICHTUNG ZUM NACHWEIS ELEKTRISCH LEITFÄHIGER SCHICHTEN DES ERDBODENS

(ARRANGEMENT FOR DETERMINING ELECTRICALLY CONDUCTIVE LAYERS OF THE GROUND

Dr. Heinrich Löwy of Vienna

32,221 Patent issued July 27, 1926.

This patent describes the determination of electrically conductive
ayers of the ground by means of an electrical oscillator carried by an air-
hip; the invention is characterized by the arrangement in which the metallic
rame of the airship serves as an antenna.

Class allowed - 1.

(290) EINRICHTUNG ZUM NACHWEIS VON LEITENDEN ODER MAGNETISIERBAREN KÖRPERN DURCH FREQUENZÄNDERUNG VON SCHWINGUNGEN

(ARRANGEMENT FOR DETERMINING CONDUCTIVE OR MAGNETIZABLE BODIES BY CHANGE OF FREQUENCY OF OSCILLATIONS)

Rudolf Hermann Heinrich Geffcken and Rudolf Hans Richter
of Leipzig-Gohlis.

35,255 Patent issued Oct. 11, 1926.

At least two oscillation systems are coupled one with another and
djusted in such a manner that in case of changes of natural frequency of
ne system, stronger changes of the coupled frequencies or of the frequency
f one of the really existing oscillations appear. It is essential that more
han one of the coupled oscillation systems be provided with a generator.

Claims allowed - 5.

(291) ANORDNUNG DER ELEKTRODEN FÜR EIN ELEKTRISCHES STROMVERFAHREN ZU BODENUNTERSUCHUNGEN

(ARRANGEMENT OF ELECTRODES FOR AN ELECTRICAL CURRENT METHOD FOR INVESTIGATING THE SOIL)

Käte Heckmann of Freiburg i. B.

435,364 Patent issued Oct. 11, 1926.

The invention described in this patent recommends the arrangement of several primary electrodes along one line at equal distances one from another; the signs of the electric tension given them must alternate; the secondary electrodes are distributed on both sides of each primary electrode so that their tension difference is equal to zero.

Claims allowed - 1.

(292) EINRICHTUNG ZUR MESSUNG UND ZUM NACHWEIS KLEINER ÄNDERUNGEN DER FREQUENZ VON ELEKTRISCHEN SCHWINGUNGSKREISEN, INSBESONDERE ZUM NACHWEIS DER DURCH UNTERIRDISCHE ELEKTRISCHE LEITER VERURSACHTEN ÄNDERUNGEN DER FREQUENZ VON LUFTFAHRZEUG-ANTENNEN

(ARRANGEMENT FOR MEASURING AND DETERMINING SMALL FREQUENCY CHANGES IN ELECTRIC RESONANCE CURRENTS, ESPECIALLY FOR DETERMINING THE FREQUENCY CHANGES IN THE AIRSHIP-ANTENNAE CAUSED BY SUBTERRANEAN ELECTRIC CONDUCTORS)

Dr. Heinrich Löwy of Vienna

436,827 Patent issued Nos. 13, 1926.

The fundamental part of the invention described in this patent discloses a method by which the electrical oscillation system under investigation is arranged in such a manner (for example, in case of tubular senders, by means of suitable choice of the constants of the oscillation current) that the oscillation process is displaced to the close proximity of a place of rupture or to the region of a sharp drop of the oscillation amplitude in which great changes of the oscillation amplitude correspond to small changes of frequency.

Claims allowed - 1.

(293) VERFAHREN ZUR BESTIMMUNG DER TIEFE VON EINLAGERUNGEN IM ERDBODEN

(METHOD FOR DETERMINING THE DEPTH OF DEPOSITS IN THE GROUND)

"Seismos" Gesellschaft m.b.H. of Hanover

440,106 Patent issued Jan. 29, 1927.

This patent discloses a method for determining the depth of deposits from the deformation of the field of lines of force. A straight cable is put ver the ground and covered with earth on both ends. The current field is udied by means of secondary electrodes. The distance between the electrodes an be increased gradually; the electrodes may be disposed symmetrically or symmetrically with respect to the source of the current which is placed in e center of them. By measuring the electric field for every position of e electrodes, a sudden and strong change of this field will indicate the resence of the deposit and will make the determination of its depth possible.

Claims allowed - 1.

(294) VERFAHREN ZUR FESTSTELLUNG UND LOKALISIERUNG VON KÖRPERN IM UNTERGRUNDE

(METHOD FOR DETERMINING AND LOCATING SUBTERRANEAN BODIES)

"Seismos" Gesellschaft m.b.H. of Hannover

42,832 Patent issued April 8, 1927.

This patent describes a method for determining and locating subteranean bodies, the electrical conductivity and the dielectric constant of which re anomalous with respect to masses surrounding them. The investigation is arried out by measuring the phase difference at various points on the ground y means of electrodes. Claims allowed - 2.

(295) VERFAHREN ZUR AUFSUCHUNG VON EINLAGERUNGEN IM ERDBODEN

(METHOD FOR LOCATING SUBTERRANEAN DEPOSITS)

Dr. Johann Königsberger of Freiburg i. B.

44,506 Patent issued May 21, 1927.

Deposits (iron ore, water, coal) which are surrounded entirely or artly by substances of a lower electrical conductivity or have a lower ielectric constant are located by measuring at various receiving stations laced approximately at equal distances from a sending station, electrical aves emitted from this sending station. The invention is based on the theory hat better electrical conductivity and greater dielectric constant of bodies ause a certain concentration of waves along the border surfaces of these odies.

Claims allowed - 1.

(296) VORRICHTUNG ZUR AUSMESSUNG DER MAGNETISCHEN KRAFTLINIEN EINES ELEKTROMAGNETISCHEN WECHSELFELDES, VORZUGSWEISE ZU ERDERFORSCHUNGSZWECKEN

(APPARATUS FOR MEASURING MAGNETIC LINES OF FORCE OF AN ELECTROMAGNETIC ALTERNATING FIELD, EXPECIALLY FOR THE PURPOSE OF GROUND INVESTIGATION)

Dr. Richard Ambronn of Göttingen

48,190 Patent issued Aug. 6, 1927.

This patent discloses an apparatus for measuring magnetic lines of force of an electromagnetic alternating field which is characterized by the following arrangement: The position of the plane of turn of the induction coil in space is indicated by a pendulum body provided with a vertical galvanoscope; this pendulum is suspended so that it can be moved freely around two axes perpendicular one to another and situated in the same plane; one of these axes is perpendicular to the plane of turn of the induction coil.

Claims allowed - 1.

(297) VERFAHREN UND VORRICHTUNG ZUR BESTIMMUNG VON ÄQUIPOTENTIALFLÄCHEN UND-LINIEN

(METHOD AND APPARATUS FOR DETERMINING EQUIPOTENTIAL SURFACES AND EQUIPOTENTIAL LINES)

Hermann Heuer of Gandersheim, Harz

453,564 Patent issued Dec. 14, 1927.

A method and apparatus is presented for measuring equipotential surfaces and equipotential lines by which their determination becomes more accurate owing to the possibility of compensating and measuring the undesirable induction currents.

Claims allowed - 5.

(298) VERFAHREN UND VORRICHTUNG ZUM MESSEN VON ÄQUIPOTENTIALFLÄCHEN UND-LINIEN

(METHOD AND APPARATUS FOR MEASURING EQUIPOTENTIAL SURFACES AND EQUIPOTENTIAL LINES)

Hermann Heuer of Gandersheim, Harz

458,021 Patent issued March 31, 1928.

This patent is an addition to patent 453,564 concerning the method and apparatus for measuring equipotential surfaces and equipotential lines. The present patent discloses an invention for discovering spatial distribution of current by means of two measurement currents, each provided with two probes, branched from the spatial conductor--for example, the ground.

Claims allowed - 7.

(299) VERFAHREN ZUR BESTIMMUNG DES ABSTANDES EINER REFLEKTIERENDEN FLÄCHE MITTELS ELEKTROMAGNETISCHER WELLEN, INSBESONDERE ZUR FESTSTELLUNG DER LAGE ELEKTRISCH LEITENDER FLÄCHEN IN DER ERDE

(METHOD FOR DETERMINING THE DISTANCE FROM A REFLECTION SURFACE BY MEANS OF ELECTROMAGNETIC WAVES, ESPECIALLY FOR DETERMINING THE POSITION OF ELECTRICALLY CONDUCTIVE SURFACES IN THE GROUND)

"Seismos" G. m.b.H. of Hannover

8,097 Patent issued April 4, 1928.

The method discussed in this patent is characterized by an arrange-
nt in which the deviation of waves of different lengths emitted from a
xed sending station and received by a fixed frame antenna, serving as the
ceiving station, is investigated in connection with the phase difference.

Claims allowed - 3.

(300) EINRICHTUNG ZUR BESTIMMUNG DER RÄUMLICHEN LAGE DER LUFTELEKTRISCHEN ÄQUIPOTENTIALFLÄCHEN UND POTENTIALDIFFERENZEN, INSBESONDERE FÜR DIE ZWECKE DER ELEKTRISCHEN BODENERFORSCHUNG

(ARRANGEMENT FOR DETERMINING THE SPATIAL POSITION OF AERIAL ELECTRICAL EQUIPOTENTIAL SURFACES AND POTENTIAL DIFFERENCES, ESPECIALLY FOR THE PURPOSE OF ELECTRICAL INVESTIGATION OF THE GROUND)

Gebr. Ruhstrat of Göttingen

1,908 Patent issued July 2, 1928.

Two collectors, rotatable vertically and horizontally about corre-
onding disks and connected by a line with an electrometer are placed in such
manner that the inclination of the line connecting the two collectors toward
horizontal plane, its horizontal direction, and the potential difference
tween the two collectors can be read directly from the apparatus.

Claims allowed - 3.

(301) VERFAHREN ZUR BODENERFORSCHUNG AUF ELEKTROMAGNETISCHEM WEGE, BEI WELCHEM DEM BODEN WECHSELSTROM GALVANISCH ZUGEFÜHRT UND DIE STÄRKE DES VON IHM ERZEUGTEN MAGNETISCHEN FELDS MIT HILFE EINER INDUKTIONSSPULE ERMITTELT WIRD

(METHOD FOR ELECTROMAGNETIC INVESTIGATION OF THE GROUND IN WHICH THE ALTERNATING CURRENT IS PASSED INTO THE GROUND GALVANICALLY AND THE STRENGTH OF THE MAGNETIC FIELD PRODUCED BY IT IS DETERMINED BY MEANS OF AN INDUCTION COIL)

Svenska Radioaktiebolaget of Stockholm

3,245 Patent issued July 26, 1928.

A method is described in which the electromagnetic investigation of the ground is carried out with the aid of an induction coil. The potential difference produced in the coil by induction is measured with a tubular voltmeter.

Claims allowed - 1.

(302) VERFAHREN ZUM AUFSUCHEN WERTVOLLER BODENEINLAGERUNGEN AUF ELEKTROMAGNETISCHEM WEGE DURCH ZUFÜHRUNG ELEKTRISCHER WECHSELSTRÖME

(METHOD FOR DISCOVERING VALUABLE DEPOSITS ELECTROMAGNETICALLY BY INTRODUCING INTO THE GROUND ELECTRICAL ALTERNATING CURRENTS)

Dr. Richard Ambronn of Göttingen

464,767 Patent issued Dec. 4, 1928.

This patent discloses a method for locating valuable deposits electromagnetically by introducing into the ground alternating current and investigating the corresponding components produced of the magnetic field vector with regard to their mutual relation, as well as their relation to a normal phase.

Claim allowed - 7.

(303) VERFAHREN ZUR PRAKTISCH VOLLSTÄNDIGEN ELIMINIERUNG DES EINFLUSSES DER INDUKTION DER ZULEITUNGEN ZU DEN ELEKTRODEN AUF DAS AUFNAHMEGERÄT EINES ZUM ZWECKE DER BODENERFORSCHUNG IN DEN UNTERGRUND GESANDTEN WECHSELSTROMS

(METHOD FOR PRACTICALLY COMPLETE ELIMINATION OF THE INFLUENCE OF THE INDUCTION OF THE WIRE CONNECTED TO ELECTRODES UPON THE RECEIVING APPARATUS OF AN ALTERNATING CURRENT INTRODUCED INTO THE SUBSOIL FOR THE PURPOSE OF THE INVESTIGATION OF THE GROUND)

Exploration Bodenuntersuchungs- and Verwertungs G. m.b.H.
of Berlin.

469,018 Patent issued Nov. 29, 1928.

This patent discloses a method characterized by the use of double wound wires. The first electrode is connected with the generator directly; the wire leading to the second electrode is branched, at a point close to the first electrode, into two lines of equal resistance; these two lines are conducted around the region to be investigated in a symmetrical form (for example in the form of a rectangle). By this arrangement the influence of the induction produced by single parts of the line upon the receiving apparatus is practically eliminated.

Claims allowed - 2.

(304) VERFAHREN ZUR BODENFORSCHUNG AUF ELEKTROMAGNETISCHEN WEGE DURCH ERREGUNG ELEKTRISCHER WECHSELSTRÖME IM UNTERGRUNDE UND AUFNAHME DER ELLIPTISCHEN SCHWINGUNGEN DES BODENSTROMES BZW. DES MAGNETISCHEN VEKTORS

(METHOD FOR ELECTROMAGNETIC INVESTIGATION OF THE GROUND BY ALTERNATING CURRENT PRODUCED UNDER THE GROUND AND DETERMINATION OF THE ELLIPTICAL OSCILLATION OF THE EARTH CURRENT OR OF THE MAGNETIC VECTOR)

Dr. Richard Ambronn of Göttingen

69,445 Patent issued Dec. 17, 1928.

The method described in this patent is characterized by the following roceeding: in all points of observation of the whole region under investigaion or of single parts of it those diameters of the ellipses of oscillation re determined for which the field vectors taken in their directions are of he same phase.

Claims allowed - 6.

(305) VERFAHREN ZUR AUSMESSUNG DES FELDES EINES INSBESONDERE ZUM ZWECKE DER BODENERFORSCHUNG MIT ELEKTRODEN IN DEN UNTERGRUND GESANDTEN WECHSELSTROMES

(METHOD FOR MEASURING THE FIELD OF AN ALTERNATING CURRENT SENT UNDER THE GROUND BY MEANS OF ELECTRODES, ESPECIALLY FOR THE PURPOSE OF GROUND INVESTIGATION)

(Addition to patent 453,564)
Hermann Heuer of Gandersheim, and others

70,231 Patent issued Jan. 10, 1929.

This patent, which is an addition to patent 453,564, discloses a implification of the apparatus. The resonance device is placed, instead of n a special measurement probe line, directly in the main line, and the hanges necessary to compensate disturbances serve directly for the location f the disturbing local deposits.

Claims allowed - 2.

(306) VERFAHREN ZUR ELEKTRISCHEN BODENFORSCHUNG DURCH VOLLSTÄNDIGE AUSMESSUNG DER ELEKTRISCHEN UND MAGNETISCHEN ELEMENTE DES DURCH DEN UNDERGRUND ZUGEFÜHRTEN WECHSELSTROME ERZEUGTEN, ELLIPTISCH POLARISIERTEN ELEKTROMAGNETISCHEN FELDES

(METHOD FOR ELECTRICAL INVESTIGATIONS OF THE GROUND BY COMPLETE MEASUREMENT OF ELECTRIC AND MAGNETIC ELEMENTS OF AN ELLIPTICALLY POLARIZED ELECTROMAGNETIC FIELD PRODUCED BY ALTERNATING CURRENTS CONDUCTED THROUGH THE SUBSOIL)

Dr. Richard Ambronn of Göttingen

471,636 Patent issued Feb. 25, 1929.

The method described in this patent discloses an arrangement by which the disturbing effects of vagabond currents are nullified by grounding that point (neutral point) of the measuring apparatus with regard to which the disturbances compensate each other.

Claims allowed - 5.

(307) EINRICHTUNG ZUR BESTIMMUNG DER LAGE VON LUFTELEKTRISCHEN ÄQUIPOTENTIALFLÄCHEN ZUM ZWECKE DER ELEKTRISCHEN BODENFORSCHUNG

(APPARATUS FOR DETERMINING THE POSITION OF ELECTRICAL EQUIPOTENTIAL SURFACES FOR THE PURPOSE OF ELECTRICAL INVESTIGATION OF THE GROUND)

Ernst Ruhstrat of Göttingen

475,434 Patent issued July 11, 1929.

This patent discloses a method for electrical investigation of the ground characterized by application of a highly sensitive electrometer, one part of which, preferably its case, serves as a collector.

Claims allowed - 1.

(308) VERFAHREN ZUR ERMITTELUNG DER LAGE UND GESTALT VON NUTZBAREN LAGERSTÄTTEN ODER GESTEINSSCHICHTEN MITTELS BEOBACHTUNG VON SCHALLWELLEN

(METHOD FOR DETERMINING THE POSITION AND THE SHAPE OF USEFUL DEPOSITS OR ROCK STRATA BY OBSERVING SOUND WAVES)

Piepmeyer and Co., Kommandit-Gesellschaft of Kassel-Wilhelmshöhe

479,724 Patent issued July 22, 1929.

This patent discloses a method for determining the position and the shape of deposits by means of observing the sound waves propagated inside of the earth. The method is characterized by variation of the intensity of the ound waves in suitable time-intervals so that any desired number of time ntervals can be observed in various receiving stations. By corresponding hifting of the receiving stations the velocity of propagation to be compared an be determined in the air as well as in the earth strata at various depths; he position and the shape of these deposits can be established accordingly.

Claims allowed - 1.

(309) KAMMSONDE FÜR DIE ZWECKE DER ELEKTRISCHEN BODENERFORSCHUNG

(PROBE COMB FOR THE PURPOSE OF ELECTRICAL INVESTIGATION OF THE GROUND)

Oberschlesische Werkstätten für Präzisionsmechanik
G. m.b.H. of Ratibor, O.-S.

81,087 Patent issued Oct. 24, 1929.

The method described in this patent consists of determining the quipotential lines of a field created by an alternating current by using, nstead of one single probe, a probe comb consisting of several metallic rods rranged at small distances on a rod so that any one of them can be connected o the measuring apparatus by means of a slide.

Claims allowed - 3.

(310) VERFAHREN ZUR BESTIMMUNG VON ÄQUIPOTENTIALFLÄCHEN UND-LINIEN, BEI DEM WECHSELSTROM DEM RÄUMLICHEN LEITER ZUGEFÜHRT UND MIT SONDEN ENTNOMMEN WIRD

(METHOD FOR DETERMINING THE EQUIPOTENTIAL SURFACES AND EQUIPOTENTIAL LINES IN WHICH ALTERNATING CURRENT IS LED IN IN THE SPATIAL CONDUCTOR AND IS TAKEN OUT WITH PROBES)

(Addition to patent 453,564)

Hermann Heuer of Gandersheim, and others

85,286 Patent issued Oct. 30, 1929.

This patent discloses a further development of the method for de-ermining equipotential surfaces and equipotential lines as described in the riginal patent, No. 453,564. Here the high resistances are reduced by a evice producing a negative resistance and containing vacuum tubes. The ntensity of the heating current of the vacuum tubes indicates the value of he resistance to be compensated, especially concerning the conductivity of eological formations.

Claims allowed - 4.

(311) VERFAHREN ZUR ELEKTRISCHEN BODENERFORSCHUNG

(METHOD FOR ELECTRICAL INVESTIGATION OF THE GROUND)

Prospector Institut für praktische Geophysik und Geologie,
Dr. Hülsenbeck and Co. of Frankfurt on the Main.

489,434 Patent issued Jan. 17, 1930.

The method for electrical investigation of the ground described in this patent concerns a proceeding by which electrical momentary waves are conducted to the ground and the progress in space and time of the distribution of the momentary waves is determined at any point of the area under investigation by means of high-frequency oscillographs.

Claims allowed - 3.

(312) VERFAHREN ZUR BESTIMMUNG DES MAGNETISCHEN VEKTORS DER KÜNSTLICH ERZEUGTEN ERDSTRÖME NACH GRÖSSE UND RICHTUNG BEI GEOPHYSIKALISCHEN UNTERSUCHUNGEN MITTELS WECHSELSTRÖME, BEI WELCHEM ALLEIN DIE GRÖSSE UND RICHTUNG DER ERDSTROM KOMPONENTE GEMESSEN WIRD

(METHOD FOR DETERMINING THE INTENSITY AND DIRECTION OF THE MAGNETIC VECTOR OF ARTIFICIALLY PRODUCED ALTERNATING EARTH CURRENTS IN GEOPHYSICAL INVESTIGATIONS BY MEASURING ONLY THE VALUE AND DIRECTION OF THE EARTH-CURRENT COMPONENT)

Prospector Institut für praktische Geophysik und Geologie,
Dr. Hülsenbeck and Co. of Frankfurt on the Main

490,910 Patent issued Feb. 3, 1930.

The method for determining the intensity and direction of the magnetic vector of artificially produced alternating earth currents by measuring only the value and direction of the earth-current component, described in this patent, consists in determining the ratio of the intensities of the horizontal component and the vertical component.

Claims allowed - 1.

(313) VERFAHREN ZUR ELEKTRISCHEN BODENERFORSCHUNG MITTELS DEM UNDERGRUND INDUKTIV ZUGEFÜHRTER WECHSELSTRÖME UND AUSMESSUNG DES ELLIPTISCH POLARISIERTEN MAGNETISCHEN FELDES DURCH SUCHSPULEN

(METHOD FOR ELECTRICAL INVESTIGATION OF THE GROUND BY MEANS OF ALTERNATING CURRENTS PRODUCED IN THE SUBSOIL BY INDUCTION AND MEASUREMENT OF ELLIPTICALLY POLARIZED MAGNETIC FIELD BY MEANS OF SEARCHING COILS)

(Addition to patent 464,767).

Dr. Richard Ambronn of Göttingen

94,831 Patent issued March 27, 1930.

This patent discloses improvements in the method for electrical nvestigation of the ground, described in the original patent 454,767, which onsist in determining the field component produced by the magnetic whirl s conjugated diameter to that diameter of the ellipse of oscillation of the agnetic vector which corresponds to the magnetic field component produced irectly at the point of observation by the alternating current. The measureents are repeated at several frequencies of the alternating current chosen o that the results obtained can be extrapolated to zero frequency.

Claims allowed - 2.

(314) VERFAHREN ZUR ELEKTRISCHEN BODENFORSCHUNG

(METHOD FOR ELECTRICAL INVESTIGATION OF THE GROUND)

Dr. Richard Ambronn of Göttingen

98,912 Patent issued May 28, 1930.

This patent discloses a method for electrical investigation of the round in which alternating currents of very low frequency (0.3 - 10 per econd) are employed and the intensity distribution of which in the current ield is measured either directly or by compensation. The measuring instruent used is a galvanometer tuned to the frequency of the sender.

Claims allowed - 3.

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GEOPHYSICAL ABSTRACTS[1]

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Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(315) PERFECTIONNEMENTS A L'INSTRUMENT TRANSPORTABLE POUR LA MESURE RAPIDE DE LA GRAVITÉ

(IMPROVEMENTS MADE ON A PORTABLE INSTRUMENT FOR QUICK MEASUREMENT OF GRAVITY)

By F. Holweck and P. Lejay

Comptes rendus de l'Académie des Sciences, Paris, vol. 192,
No. 18, 1931, pp. 1116-1119

The principles and construction of an instrument for quick measurement of gravity were explained by the authors in a previous article published in the Comptes rendus de l'Academie des Sciences, vol. 190, No. 24, 1930 (see Geophys. Abs. No. 21, p. 2).

In this article the improvements made on the instrument are described and illustrated by a schematical drawing. The method of observation has also been changed considerably by abolishing the recording and replacing it by direct stroboscopic observation. Fifteen minutes are required for making one observation.

Measurements of gravity were carried out near Dijon in order to test the instrument, and it was established that the new model was ten times more accurate than the old one. The instrument was not affected by being transported in an automobile for more than 2,000 kilometers without any special protection.—W. Ayvazoglou.

(316) GRAVITY GRADIENT AND CURVATURE

By Edith A. Nelson

Philosophical Magazine No. 10, Sept., 1930, pp. 513-516

A survey with the Eötvös balance shows that in certain instances the curvature of the level surface changes sign when the gravity gradient is a maximum, while in other cases this does not hold. Investigation shows that there is no general relation between the quantities, and that this phenomenon is evidence of stratification in that region of the earth's crust, the edge of the stratum being situated below the point of the maximum gradient.—Abstract from Science Abstracts, vol. 34, No. 398, 1931, p. 96.

(317) DAS GEOID

(THE GEOID)

By F. Ackerl

erlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 3/4, 1931, pp. 273-335.

In this article Ackerl considers the question of the mathematical figure f the earth according to theories advanced by Hopfner and developed by Bruns, s he thinks it desirable to give numerical calculations of the theoretical esults. The article contains the following items:

A. Theoretical argumentations.
B. Observation material.
C. Sources of reference.
D. Remarks to the sources of reference.
E. Lines of equal gravity.
F. Special maps of G lines.
G. World map of lines of equal gravity.
H. Determination of the apparent level spheroid.
I. The world map with the lines of equal apparent gravity anomalies.
K. Special maps of apparent gravity anomalies.
L. The presumable value of the undulations of the geoid.
M. Conclusive remarks.

A translation of the author's abstract reads as follows:

F. Hopfner proposed a hypothesis-free method of determining the shape of the geoids. This method requires values of gravity which are derived from the gravity observed according to well-founded viewpoints established in physics. All values of gravity published till July, 1930 (as far as they were known by the author), are reduced by A. Prey's method to correspond with the sea level of Vienna, which is taken as the starting point.

By using these gravity values a world map is drawn in which the course of lines of equal gravity is shown. The constants of the apparent level spheroid are computed by a preliminary application of the summary method. The calculated anomalies are used for drawing a world map in which the lines of equal apparent gravity anomalies are represented. From the amount and distribution of these anomalies a conclusion as to the amount and distribution of undulations of the geoid with regard to the true level spheroid can be drawn.--W. Ayvazoglou.

(318) DAS SCHWEREPROFIL DER TAUERNBAHN

(THE GRAVITY PROFILE OF THE TAUERN RAILROAD)

By Robert Schwinner

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 3/4, 1931, pp. 352-416.

The investigation is based on the determination of gravity made in 1910-1912 along the Tauern railroad and the parallel profile Rauris-Sonnblick-Ober-Drauburg, and especially on the determinations of gravity anomalies $G_0-\gamma_0$ -- that is, on the observed gravity, reduced to sea level according to Bouguer's method, less the normal gravity γ_0, the latter being assumed according to Helmert's formula of 1901. In the first place the question of the density of rocks, which is fundamental to all gravimetric problems, is discussed in general and in particular with respect to the rocks found in the Tauern profile improvements made on Bouguer's reduction formula at several stations resulted in considerable changes of the final values of anomalies to be applied.

The problem was to find, by investigation based on geological and geophysical premises, a disposition of the subterranean disturbing masses, such that the gravity anomalies $G_0-\gamma_0$ resulting from the reduction of the measurements might be explained by their attraction. Owing to the fact that these "measured anomalies" in this case, as well as in the Alps in general, are all negative only a negative disturbing mass was to be considered--that is, rocks which had a lighter specific weight than the surroundings at the same level.

Local disturbances were caused chiefly by the Tauern granite (density of the disturbing mass = δ = -0.15) and in much less degree by the calcareous phyllite (δ = -0.05) of which only its accumulation on the northern slope was taken into consideration. For the granite resulted as the most probable form, that of a horizontal plate or a flat lens, about 8 to 9 kilometers thick, at the northern border of which a vertical root or a dyke, of at least 5 kilometers in magnitude, is placed. The supposition of some geologists that the granitic masses of the Tauern are dipping at their southern border in the forms of large roots or dykes does not agree with the present determinations of gravity.

The regional negative gravity in the Alpine region is represented (according to Airy) as the effect of a "mass deficiency" caused by the fact that under the Alps the acid rocks of the outer crust (sial) are sinking, owing to their weight, lower into the basic substratum (sima) than the neighboring areas; the form can be simplified and represented as a rectangular Graben in the sima filled with sial (δ = 2.8 - 3.1 = -0.3) descending at the southern border from 30 to 40 kilometers and at the northern border rising in two steps from 40 to 35 and from 35 to 30 kilometers to the normal depth of the sial-sima bordering plain which, according to seismic data, is supposed to be 30 kilometers only. These three steps correspond to the trend line of e principal faults of the Alpine structure; the line of the Drau, of the lzach and the border of the Alps; it is supposed that the two former are pping northward and the latter southward. From this assumption a disrbance of gravity is computed which is sufficiently in accordance with the omalies determined, especially because for the smaller variations onnblick northern slope, Bischofshofen-Hochkönig, Hallein-Berchtesgaden) e local causes of disturbance can be proved as resulting from geological nditions.

Based on these assumptions on the disposition of masses the hydrostatic lift was estimated, corresponding to the conception resulting from Airy's pothesis that the floating of sial is similar to the floating of pack ice. evailing of weight was established in the region of the Drau; prevailing of lift was found at the northern border and far beyond the Solzach and preiling of weight again in the country of Berchtesgaden. This corresponds to e fact that the region of the Drau and the Carinthian Lakes, as well as the gion of Berchtesgaden, are proved to be sinking during centuries, while the uern and the region to the north, up to the Hochkönig, are being lifted up.

Geologically, the data of the gravity profile and the supposed masses em to prove that in this region vertical movements play the main part (in me way according to K. Lehmann's "Pingen-Theory") and speak against the rizontal dislocation, the latter idea being recently emphasized too much.

In conclusion some directive lines for the continuation of the gravity asurements in the Tauern are given.--Author's abstract translated by Ayvazoglou.

(319) EIN BEISPIEL ZUR ENTWICKLUNG DES RAUMPOTENTIALS NACH KUGELFUNKTIONEN

(AN EXAMPLE FOR THE RESOLUTION OF THE SPACE-POTENTIAL ACCORDING TO SPHERICAL FUNCTIONS

By K. Jung

rlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 3/4, 1931, pp. 346-351.

Using a simple and evident example (a homogeneous oblate ellipsoid of volution) the author shows that the resolution of the spherical functions of e external space potential can not be applied inside of masses, also not ar the surface and even not if the series of the external space potential nverges in one part of the mass volume.--Author's abstract translated by Ayvazoglou.

2. MAGNETIC METHODS

(320) REPORT ON THE MAGNETIC SURVEYING IN THE YEARS 1924-1925 OF THE MAGNETITE SCHISTS IN THE REGION OF THE KOLA-FIORD AND ON THEIR POSSIBLE ECONOMIC IMPORTANCE (IN RUSSIAN)

By A. S. Purtov

Bulletin of the Geological and Prospecting Service, Moscow, U.S.S.R., vol. 49, No. 10, 1930, pp. 45-72.

The article consists of two parts. In the first the magnetometric survey carried out in 1924-1925 is described; in the second the author gives an economic estimation of the reserves of magnetite deposits based on the data obtained from this survey.

An area of about 110 square kilometers was covered by the survey, 9,500 observations being made. Thalen-Tiberg's magnetometer was used.

The main results obtained by the survey are summed up as follows:

1. The width of the ore-bearing complex was determined to be considerable.
2. The distribution of the separate orebodies in the complex was found to be scattered.
3. A series of new strong anomalies was discovered.
4. The strongest anomalies were found to be in the northern part of the complex.
5. Finally, indications concerning the relations between the different ore types and the intensity of the anomalies were established.

The possible total reserves of all the largest deposits calculated on the basis of the data obtained from the magnetic survey are considered to be about 24 millions tons.--W. Ayvazoglou.

(321) RECONNAISSANCE MAGNÉTIQUE EN SYRIE

(MAGNETIC INVESTIGATION IN SYRIA)

By Jean Chevrier

Comptes Rendus de l'Académie des Sciences, Paris, vol. 192, No. 16, 1931, pp. 977-978.

The purpose of this investigation was to determine the magnetic elements (declination, inclination, intensity of the horizontal component) in the desert regions. The observations were carried out by a theodolite compass (Brunner-Chasselon model No. 3) and an inclination needle (Chasselon model No. 1).

The error in declination may be considered to be about 2 minutes for the st unfavorable conditions. An error of the same order may be expected for clination. The error in determining the horizontal component has proved to very small.

A comparison of values obtained during this investigation in Karyatein d in Palmyre with declinations observed by the Carnegie expedition in 1911 the same places, shows a secular variation of 6.5 toward the east.

The results of observations are given in a table.--W. Ayvazoglou.

(322) GENERAL PRINCIPLES FOR DETERMINING THE EXTENSION AND DEPTH OF AN OREBODY HAVING THE SHAPE OF AN OBLATE ELLIPSOID OF REVOLUTION MAGNETIZED PERPENDICULAR TO THE AXIS OF REVOLUTION (IN RUSSIAN)

By N. Boulgakov and A. Jouravsky

lletin of the Geological and Prospecting Service, Leningrad, U.S.S.R., vol. 49, No. 5, 1930, pp. 61-73.

In this paper the authors study the magnetic field of an orebody having e shape of an oblate ellipsoid of revolution and being magnetized in the rection perpendicular to the axis of revolution. Tables are computed with e aid of which the components X, Y, and Z for different points of the eld may be easily determined.--W. Ayvazoglou.

3. SEISMIC METHODS

(323) SHOCK DISPERSION

By K. Sezawa and G. Nishimura

lletin of the Earthquake Research Institute, Tokyo, vol. 8, No. 3, 1930, pp. 321-337.

That part of transmitted waves dispersed by an echoing medium is not of gular form, while the oscillatory part of ordinary dispersed waves is quite gular and has gradually varying wave length. In echoed dispersion the leadg part is distinct and has large amplitude. In ordinary dispersion both ading and trailing parts have their own velocities of propagation. A poron of the vibrations of echoing dispersion is of a gradually decaying type, ilst in ordinary dispersion this is not in general possible.--Author's stract.

(324) SEISMOGRAPHEN IM DIENSTE DER GLETSCHERFORSCHUNG

(SEISMOGRAPHS IN THE SERVICE OF GLACIER INVESTIGATION)

By Hans Mothes

Forschungen and Fortschritte, Berlin, vol. 6, No. 28, 1930, pp. 363-365.

The importance of a knowledge of the thickness of glacier ice in geophysical prospecting, as well as in climatology and the study of isostatic equilibrium of the earth crust, was the cause of investigations of glaciers by means of geophysical methods which have been undertaken since 1925.

In this article the author gives a description of his first practical work on glacier investigations carried out in August, 1926, in Hintereisferner (Ötztaler Alps). This place was chosen because it had already been extensively studied by H. Hess.

Wiechert's field vertical seismometer was used. Seismograms as well as travel-time curves are given in figures. Of special interest are curves showing hyperbolic form, as theoretically they represent waves reflected in the underground during their path from the point of explosion to the point of observation. Greater distances of these curves from the abcissa indicate greater thickness of the ice stratum and vice versa. The path of these waves and therefore the depth of the reflection underground could be calculated from the travel time taken from the seismograms; of course their velocity was to be known. This velocity has been established to be 3,600 meters per second.

The correctness of data obtained by seismic method of investigation was proved by borings carried out by Hess and others, as well as by additional investigations made by the author and published in Zeitschrift für Geophysik, vol. 6, Nos. 3-4, 1929 (see Geophys. Abs. No. 9, p. 13). Similar investigations were made by the author in August, 1929, on the Pasterze Glacier (Eastern Alps) and were published in Zeitschrift für Geophysik, vol. 6, No. 8, 1930 (see Geophys. Abs. No. 21, p. 7).--W. Ayvazoglou.

(325) ÜBER DIE HERDTIEFE DER ERDBEBEN

(ON THE DEPTH OF EARTHQUAKES' FOCI)

By Gerhard Krumbach

Forschungen und Fortschritte, Berlin, vol. 6, No. 32, 1930, pp. 419-420.

Two methods for the determination of the focus of an earthquake are pointed out by the author:

1. The macroseismic method -- in which the propagation of the intensity a quake on the surface of the earth as resulting from observed shocks and structions in the area of the quake is studied (determination of isoseismal nes).

2. The microseismic method -- in which the records of seismic instruments e used and the periods of time of propagation of definite forms of seismic ves are studied in dependency from the distance of the focus; that is, avel-time curves are drawn (determination of isochronous lines). Both thods are discussed. Krumbach concludes that although a series of important sults on investigations concerning the depth of the foci of earthquakes have ready been obtained, this work must be continued in order to get valuable formation on the structural changes inside of the earth crust.--W. Ayvazoglou.

(326) ON DEEP-FOCUS EARTHQUAKES

By R. Stoneley

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 3/4, 1931, pp. 417-435.

Professor Turner has found that the foci of earthquakes may occasionally situated as low as 0.09 of the earth's radius below normal; that is, they occur 580 kilometers below the surface.

Allowance for the known errors of the Zöppritz-Turner tables would robably reduce these depths considerably.

According to a general reciprocal theorem in dynamics, since the plitudes of surface waves fall off rapidly at great depths, the surface aves of deep-focus earthquakes should be small or insensible. Yet the ternational Seismological Summary gives L and M readings even for the eepest foci contemplated.

It is here shown that in some of the deepest focus earthquakes, the re- orded L and M are scarce and often nonexistent at great distances. The ecorded observations mostly refer to S, SS, SSS, etc., or else to Gutenberg's arly long wave G, for which the almost complete extinction is not to be ex- ected, as the period is very long.

The actual records of these very deep-seated shocks show a very onspicuous P, a large S, SS, and further disturbances, and no L or M. The mplitudes of the general disturbance at the calculated positions of L and M re smaller, often much smaller, than that of P.

Finally, a tribute must be paid to the pioneer work of the late Professor urner. His deep-focus earthquakes, even if not of such great depth as he hought, have at any rate a focus in some cases far below normal.--Author's bstract.

(327) SEISMOMETRIC STUDY OF THE RECENT DESTRUCTIVE NORTH IDU EARTHQUAKE

By A. Imamura

Bulletin of the Earthquake Research Institute, Tokyo, vol. 9, No. 1, 1931, pp. 36-49.

In this article Imamura describes seismometric studies carried out in connection with the earthquake in North Idu which occurred on November 26, 1930. The results of the investigation are summed up as follows:

1. Of various earthquake phenomena, the outstanding one is the relation between the distributions of faults and seismic intensities. Of the number of faults that appeared, four were found especially noteworthy; a description of them is given.

2. Another characteristic feature was observed in the seismograms obtained at Tokyo. The result of the study of the diagrams is given in a figure. It shows the time of the commencement and of the duration of the tremors, and the period and amplitude of the S phase. Further analysis shows that the earthquake consisted of waves which may be regarded as having emerged from four different sources.

3. Another interesting feature is the presence of vibrations of a period of some 10 seconds from the very beginning to the last, and attaining after 30 seconds from the commencement a double amplitude of so much as 14.7 centimeters--largest amplitude so far perfectly recorded with instruments in Japan. These long waves were propagated to Tokyo first as waves of dilatational type and then as those of distortional type; they may be regarded as caused by the bodily movement of the crustal block constituting the seismic region.

The block movement thus seems to have started somewhere near the middle point of the fault system and passed on one hand quietly over the meridional fault toward the north and on the other hand toward the south, sharp destructive shocks having emerged from both of the three oblique faults.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(328) SALT DOME STUDIES BY GEOELECTRICAL METHODS

By Karl Sundberg

The Petroleum Times, London, vol. 25, No. 638, 1931, p. 507.

After a brief explanation of Swedish electromagnetic method for structural studies, Sundberg concludes that geoelectric methods were successful in the detailed determinations of the flank conditions of salt domes, and especially in locating faults against which oil might accumulate, discovered in the Gulf Coast region by geophysical, chiefly seismic, methods.

Two figures representing electromagnetic investigations across salt- me structures are given.--W. Ayvazoglou.

5. RADIOACTIVE METHODS

(329) ULTRA-PENETRATING RAYS

By H. Geiger

Nature, London, vol. 127, No. 3212, 1931, pp. 785-787

In this article the author discusses the results obtained from experiments the origin and nature of γ-radiation carried out by methods improved dur- g the past few years in the following two directions: (1) along electro- tric lines by the registration and the application of high-pressure chambers, d (2) by the method of electron counting. In the pressure chamber the degree ionization produced in the gas by the ultra radiation is measured, while in e tube electron counter the high-velocity electrons coupled with the ultra diation are registered singly.--W. Ayvazoglou.

(330) EINE EINFACHE METHODE ZUR AUTOMATISCHEN REGISTRIERUNG VON KOINZIDENZEN IN GEIGER-MÜLLERSCHEN ZÄHLROREN

(A SIMPLE METHOD FOR AUTOMATIC RECORDING OF COINCIDENCES IN GEIGER-MÜLLER'S TUBE COUNTERS)

By J. N. Hummel

Die Naturwissenschaften, Berlin, vol. 19, No. 18, 1931, pp. 375-376.

An arrangement by which two tube counters are electrically connected one th another in order to obtain direct coincidence measurements is described.

Owing to this arrangement the amplitude of the deflection of the electro- ter is considerably increased.

The manner of connection is shown in a figure.--W. Ayvazoglou.

(331) STRAHLUNG VON ANTENNEN UNTER DEM EINFLUSS DER ERDBODENEIGENSCHAFTEN

(ANTENNAE RADIATION UNDER THE INFLUENCE OF SOIL PROPERTIES)

By M. J. O. Strutt

Annalen der Physik, Leipzig, vol. 9, No. 1, 1931, pp. 67-91.

In the first two sections of the article the author describes the arrange- nt and verification of a tubular sender and a tubular receiver provided with plifier and a tubular voltmeter for 1.42 meters wave length. The main im- rtance was laid to the work of the measurement arrangement exclusively by tennae, avoiding any parasitic radiation.

With this arrangement the electrical soil properties were measured by using 1.4 meters wave length according to a new method. A larger value of the index of refraction of the ground was obtained than that which results from the properties of the same soil measured at about 15 meters. The most probable explanation was thought to be the fact that the conductivity of the earth for very short waves (about 1 meter) increases considerably with the decrease of the length of the wave.

This behavior was established for the soil consisting of sand, humus, clay, and grassland. In case of water the measured index of refraction agreed with theoretical expectation ($80 = \mathcal{E}$).

Measurements concerning the direction of polarization of waves emitted from the vertical and horizontal antennae had also shown a great index of refraction of the earth. The theory could be verified by measuring radiation diagrams in a vertical plane; especially the theoretical expectation that the received field strength in vertical sending antennae increases close to the ground in proportion to the height above the ground. These measurements also had shown a large index of refraction of the earth. Finally, the dependency of the strength of receiving from the distance between the sender and receiver was measured for the vertical and horizontal sending antennae. Here the theoretical expectation, established first by von Hörschelman, according to which the distance law in case of the two kinds of antennae is the same, was confirmed.--Author's abstract translated by W. Ayvazoglou.

(332) GEOLOGISCHE UND GEOPHYSIKALISCHE (RADIOACTIVE) UNTERSUCHUNGEN AM WESTRANDE DES GÖTTINGER LEINENTALGRABENS

(GEOLOGICAL AND GEOPHYSICAL (RADIOACTIVE) INVESTIGATIONS ON THE WESTERN BORDER OF THE GÖTTINGEN GRABEN OF THE VALLEY OF THE LEINE)

By Valeriu Patriciu

Abhandlungen der Preussischen Geologischen Landesanstalt, Berlin, No. 116, 1930, pp. 163-194.

This article consists of two parts; the first deals with the geological and the second with the geophysical (radioactive) investigation of the region mentioned in the title. Only the second part is considered in this abstract.

Contents of the second part:

1. Introduction. A brief historical outline of previous works on radioactive methods of investigation is given.

2. Apparatus. The apparatus used was that constructed by R. Ambronn (described in the Physikalische Zeitschrift, 1925, pp. 444-446); the method described in Ambronn's book, Methoden der Angewandten Geophysik, has been followed in general.

3. The plan of the work and the measurement procedure. The most ractical way of carrying out the work is described; points of measurement to e selected along a straight line were fixed at about 8 meters distance one rom another, the distances to be shortened to 4 or 2 meters only after abormal distribution of emanation is observed. Holes of 3 centimeters in iameter and 80 to 100 centimeters in depth for inserting probe tubes are ored. The radium emanation of the ground is pumped into the ionization hamber. The reading of the position of the electrometer string is made very 30 seconds.

4. Preliminary tests to determine errors in the values of the measureents. The sources of these errors were eliminated by technical means.

5. Measurements for revealing the structure of the earth's crust. Plan f investigation; carrying out of measurements and graphical representation f the results; the results.

6. Limits of inaccuracy. The causes as well as the order of the errors ere examined, and their influence upon the final results was established.

7. Concerning the reasons of higher radioactivity in tectonic fissures. xplanations are given.

In conclusion the author summarizes the results of geophysical investigaion as follows:

1. The possibility of the application of the radioactive methods as eveloped by Ambronn for the explanation of tectonic questions in the regions f Saxony's disturbances is proved.

2. Material for the examination of the factors on which the success of he radioactive measurements depends is collected.

Maps of the region under investigation and a table with curves of radioctivities along the profiles are added.--W. Ayvazoglou.

(333) APPARATUS WITH CLOSED AIR CURRENT FOR THE DETERMINATION OF RADIOACTIVITY OF LARGE MINERALOGIC COLLECTIONS (IN RUSSIAN)

By V. Dubov and K. Pogodaev

ulletin of the Geological and Prospecting Service, Leningrad, U.S.S.R., vol. 49, No. 9, 1930, pp. 100-101.

The apparatus described in this article is an improvement of a similar pparatus constructed by S. Artsybyshew and V. Pleshanova (see Geophys. Abs. o. 8, 1929, p. 18). The size of the metallic chamber in which the box conaining the samples to be investigated is placed is reduced to 55 by 55 by 14 entimeters. The central part of the chamber has a raising of the form of a runcated cone, inside of which a ring-shaped commutator is fixed. Inside of he chamber, at 1.5 centimeters from its top and 4 centimeters from its walls, a cover is placed; this cover is provided in the center with a tube 11 centimeters in diameter and 4 centimeters in height in which a propeller is inserted; the propeller is put in rotation by means of an electromotor.

The air driven by the propeller from the ionization chamber passes by the commutator, enters in the upper part of the apparatus, and returns again into the ionization chamber.

The current is measured by an electroscope provided with a reading microscope. Commutators of 9 to 13 centimeters in diameter and a capacity of 8.6 to 10 centimeters were used. Four disks coated with a thin layer of U_3O_8 were distributed over the bottom of the box of the size, 52 by 52 by 6 centimeters.

The results of observations are given in a table. A schematical design of the apparatus is shown in a figure.--W. Ayvazoglou.

6. GEOTHERMAL METHODS

(334) ZUSAMMENHANG ZWISCHEN DER GEOTHERMISCHEN TIEFENSTUFE UND DER WÄRMELEITFÄHIGKEIT DER GESTEINE

(RELATIONSHIP BETWEEN THE GEOTHERMAL DEPTH GRADIENT AND THE HEAT CONDUCTIVITY OF ROCKS)

By H. Börger

Glückauf, Essen, vol. 67, No. 17, 1931, pp. 545-551.

The article is divided into two chapters: (1) Investigation of the influence of the heat conductivity of rocks upon the geothermal gradient, and (2) heat-conductivity of various rocks.

From the investigations on the relationship between the heat conductivity of rocks and the geothermal gradient the author draws the conclusion that geothermal gradients have different values in different rocks deposited in layers and that their ratio depends on the heat conductivity of the different kinds of rocks.

The numerical value of the geothermal gradient inside of a certain type of rock depends not only on its capability of conducting heat but also on the ratio of magnitude of rocks overlying one another.

The author gives examples showing that in rocks, the geothermal gradient of which is high owing to their good heat conductivity, the temperature may be unusually high if the deposits overlying them have a lower heat conductivity. The differences in heat conductivity of single types of rocks are sufficient for the explanation of the unusually high temperatures often observed in salt mines and coal mines, without the necessity of assuming the existence of special sources of heat.

The article is illustrated by four figures.--W. Ayvazoglou.

(335) DEEP GOLD MINES AND GEOTHERMAL GRADIENTS

Editorial note

gineering and Mining Journal, New York, vol. 131, No. 10, 1931, p. 447.

Geothermal gradients as established in some deep gold mines are mentioned this note. The data may be of interest; they are:

1. The temperature at the 4,300-foot depth of the Kirkland Lake gold mine Ontario is only 69° the increment being about 1° for every 150 feet.

2. In the St. John del Rey property, in Brazil, although the mine is at altitude of 3,000 feet, the rock temperature at current working depths of low 7,100 feet is 127°, the geothermal gradient being about 1° for every 0 feet.

3. At the Kennedy, in California, the geothermal gradient was found to be 3 feet per degree, giving a rock temperature of about 91° on the 4,950-foot vel.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(336) APPLIED GEOPHYSICS

By A. Broughton Edge

Nature, London, vol. 127, No. 3212, 1931, pp. 783-785.

In this article the author gives a review of the recently published book titled Applied Geophysics: A Brief Survey of the Development of Apparatus d Methods Employed in the Investigation of Subterranean Structural Conditi- ons and the Location of Mineral Deposits, by Capt. H. Shaw, with the sistance of J. McG. Buckshaw and S. T. Newing (see Geophys. Abs. No. 25).

In the introduction to the review Edge says:

> In opening to the public a geophysical exhibition and in publishing a handbook which not only is descriptive of the exhibits but also constitutes an admirable historical résumé of and introduction to the study of applied geophysics, the Science Museum, South Kensington, has taken an important step in promoting the development of this branch of science, a step which is particularly appropriate at the present moment in view of the growing appreciation in Great Britain of the practical value of these relatively new methods of exploration.--W. Ayvazoglou.

(337) ARTICLES APPEARING IN THE TRANSACTIONS OF THE AMERICAN GEOPHYSICAL UNION, TWELFTH ANNUAL MEETING, APRIL 30, AND MAY, 1, 1931, HELD IN WASHINGTON, D. C.

National Research Council of the National Academy of Sciences, Washington, D.C., June, 1931.

The present volume includes the transactions of the twelfth annual assembly. The year's activities of the Union and on the Stockholm meeting and on proposed geophysical work in polar regions and resolutions submitted by the several sections were adopted. The individual section meetings were marked by numerous progress reports on the geophysical activities not only in the United States but also in Canada and Mexico.

The first part of the volume (pp. 7-34) deals with reports and papers presented to the general assembly. The contents are as follows:

1. Resolutions adopted: On gravity at sea; on internal cooperation in the study of tidal waves; on comparisons of new types of seismological instruments developed in the U. S. with various types developed in Europe; commemorating fiftieth anniversary of General Greely's participation in the First International Polar Year; and on the death of Franklin G. Tingley.

2. A short report on the Stockholm Assembly and on proposed geophysical work in polar regions, by J. A. Fleming.

3. Symposium on time signals: (a) United States Naval Observatory time-service, by J. F. Hellweg; (b) Time signals for electrical and physical measurements, by Frank Wenner; (c) Time signal needs for geodetic work, by Edwin J. Brown; (d) Letters bearing on symposium from J. B. Macelwane, Harry O. Wood, and B. Gutenberg; (e) Establishment of world time, by F. W. Lee; (f) The service available from the standard-frequency transmissions of the Bureau of Standards, by J. H. Dellinger; (g) The accuracy of the primary frequency standard of the Bureau of Standards, by Charles G. McIlwraith; and (h) Informal communications by C. W. Horn, H. A. Affel and W. A. Marrison.

In the following parts of the volume the papers presented in various sections are discussed:

The Section of Geodesy (pp. 35-58). Gravity work, instrumental progress, the moon's influence on latitude, and the establishment astronomically of points on an unsurveyed line were presented in the following papers: (a) Progress report on the absolute determination of gravity at Washington, D.C., by Paul R. Heyl; (b) Mexican gravity stations in 1930 and first calculations and corrections for topography and isostasy, by Elfego Ruiz; (c) Gravity at the Stockholm meeting of the International Geodetic and Geophysical Union, by Walter D. Lambert; (d) Progress report on graduation and calibration of precision-circles, by Lewis V. Judson; (e) Further investigations of the moon's influence on latitude, by H. T. Stetson; (f) The establishment astronomically of points on an unsurveyed provincial boundary, by Noel J. Ogilvie; and (g) Progress in geodetic work during the past year, by William Bowie.

The Section of Seismology (pp. 59-78). Attention was devoted to
eoretical considerations, relations of geodetic operations to seismological
terpretations, registration of time signals, progress reports on instru-
ntal developments, and the provision made to realize the Union's resolution
its eleventh annual assembly to establish a seismological observatory in
uth America (near Huancayo, Peru). The following papers were presented in
nnection with these questions: (a) Velocity of explosion-generated longi-
dinal waves in a nepheline syenite, by L. Don Leet and Maurice Ewing;
) Geodetic work lays the basis for study of earth movements, by William
wie; (c) Registration of the time signals at Georgetown, by F. W. Sohon;
) The origin of earthquake waves, by Harry Reid; (e) Report on proposed
tablishment of a seismological observatory at Huancayo, Peru (read by the
cretary); (f) Report of progress on accelerometer for recording earthquake
ocks, by G. L. Hosmer; (g) Progress report on development of instruments,
Frank Wenner and McComb; (h) The development of a tilt-meter, by George
Merritt; (i) Progress report on development of seismological instruments,
H. E. Comb; (k) Report on the construction of a 3-drum seismograph re-
rder, by W. H. Reynolds; (l) Observations of development in instruments at
e Seismological Research Laboratory in Pasadena, by N. H. Heck; and (m)
morandum on the New York earthquake of April 20, 1931, by Frank Neumann.

The Section of Meteorology (pp. 79-90). Much time was given to dis-
ssion of the international polar year prospects, followed by a report on
e Madrid meeting in March, 1931, of the international commission for the
ploration of the upper air, discussion of proposed international cloud
las and papers on atmospheric turbidity, measurement of color of sea and
y, and cyclical variations in relation to long-range weather forecasting.
ne papers were presented.

Section of Terrestrial Magnetism and Electricity (pp. 91-144). The
pers presented to this section were given in four groups relating to (1)
e year's investigations in progress in the United States; (2) the Stockholm
sembly, (3) extraterrestrial considerations, and (4) polar research. The
st of the papers is as follows: (a) magnetic work of the United States
ast and Geodetic Survey, 1930-31, by D. L. Hazard; (b) Field and laboratory
vestigations of the Carnegie Institution of Washington, by J. A. Fleming;
) Recent developments in radio-transmission measurements, by G. W. Kenrick
d G. W. Pickard; (d) The U. R. S. I. cosmic radio broadcast, by Watson
vis; (e) Reports of geomagnetic and electric work of organizations and
dividual investigators in the United States, 1930-31, by Harlan W. Fisk;
) Reports submitted on work in terrestrial magnetism and atmospheric
ectricity (fourteen papers); (g) The Stockholm assembly of the Inter-
ational Union of Geodesy and Geophysics--Proceedings of the section of
errestrial Magnetism and Electricity, by H. D. Harradon; (h) Investiga-
ions at the Perkins Observatory of changes in the Kennelly-Heaviside layer
s a function of lunar altitudes, by H. T. Stetson; (i) Notes on correla-
ion investigations between Kennelly-Heaviside layer and lunar altitudes,
y Greenleaf W. Pickard; (k) Use of magnetic data for investigating radia-
ion from the sun, by J. Bartels; (l) The electrical state of the sun, by
oss Gunn; (m) The ultraviolet-light theory of comet activity, by H. B.
aris; (n) Magnetic observations on a moving ice floe, by W. J. Peters;
o) Isomagnetic charts of the arctic area, by Harlan W. Fisk; (p) Significance
f geoelectric data from the polar regions, by O. H. Gish; and (q) A Fort
onger polar expedition program, by H. B. Maris.

The Section of Oceanography (pp. 145-180). The communications presented to this section were chiefly progress reports showing excellent development of oceanographical work in the United States by governmental and private organizations (11 papers).

Section of Volcanology (pp. 181-186). Five papers were given relating to the solubility of water in granite magmas, and to the Merapi, Katmai district, Cripple Creek, and Valles Mountain volcanoes.

Section of Hydrology (pp. 187-229). The meeting of this section was devoted to statements of the formal organization of the section (14 papers were presented).--W. Ayvazoglou.

(338) ENTWICKLUNG UND STAND DER GEOPHYSIKALISCHEN DURCHFORSCHUNG DER SÜDSTAATEN VON U. S. A.

(DEVELOPMENT AND CONDITION OF GEOPHYSICAL EXPLORATION OF THE SOUTHERN STATES OF THE U. S. A.)

By Rudolf v. Zwerger

Petroleum Zeitschrift, Berlin, vol. 27, No. 19, 1931, pp. 335-347.

The author divides the southern States, the development and conditions of geophysical exploration of which is discussed in this article, into four large regions:

1. The Gulf embayment.
2. Bend Arch and Balcones fault zone.
3. Permian Basin of west Texas and New Mexico.
4. The Amarillo-Wichita-Arbuckle mountains with the bordering parts of north Texas and south Oklahoma.

The use of various geophysical methods with respect to these regions is discussed. The difference in geological conditions and their effect upon the development of geophysical work during the last years is mentioned.

In conclusion the author gives a prospect on the future possibilities of geophysical exploration in the southern States.--W. Ayvazoglou.

(339) PROGRÈS DE LA GEOPHYSIQUE APPLIQUÉE

(PROGRESS OF APPLIED GEOPHYSICS)

By J. B. Ostermeier-Althegnenberg

a Revue Pétrolifère, Paris, Nos. 425, 426, 427, 1931, pp. 655-659, 685-688, and 717-720.

The original article was published by the author in the Internationale eitschrift für Tiefbohrtechnik, Erdölbergbau und Geologie, vol. 38, 1930. he article appearing in the Revue Pétrolifère is a translation made by ierre Pelecier.

Magnetic, gravimetric, seismic, and electrical methods of prospecting re discussed and illustrated by examples; figures and diagrams are added. n the last part of the article the author gives a description of improveents made by him on the field balance (Askania) in order to increase the recision and rapidity in measurements of the vertical terrestrial magnetic ntensity. The problem of lessening the influence of the ground by elevating he instrument is partly solved by providing the instrument with a horizontal nstead of a vertical visual apparatus; some other improvements are described, specially those concerning the influence of variations of temperature. The ime necessary for one observation was reduced to about 7 minutes, as comared with 15 to 20 minutes required by the instruments used so far.-- . Ayvazoglou.

(340) GEOPHYSICAL INVESTIGATIONS CARRIED OUT IN THE SALT-DOME AREAS OF THE GULF COAST OF TEXAS AND LOUISIANA

By Carl Schmidt.

The Petroleum Times, London, vol. 25, No. 638, 1931, pp. 508-509.

Some of the results which had been derived from the use of seismic methods, ither alone or in conjunction with the gravimetric method, in the salt-dome reas of the Gulf Coast of Texas and Louisiana since 1924 are described and he most important discoveries mentioned. Schmidt concludes that the extenive use of seismic method, as well as other geophysical methods of investiation, had resulted in the finding and exploitation of oil fields of enormous alue, enabled oil companies to avoid the expenditure of vast sums of money n fruitless drilling, and had made it possible for operators to plan uccessful and economical drilling campaigns for many years ahead.--W. yvazoglou.

(341) THE PROGRESS OF GEOPHYSICS

Editorial note

The Petroleum Times, London, vol. 25, No. 638, 1931, p. 510.

This article refers to the exhibition at the Science Museum in London of apparatus and equipment used in geophysics.

Many types of instruments now in use for geophysical prospecting by magnetic, gravitational, and seismic methods are represented. A special brochure to assist students to get maximum value from a study of the exhibits has also been prepared.--W. Ayvazoglou.

(342) SEARCHING FOR MINERALS WITH SCIENTIFIC INSTRUMENTS

By E. Lancaster-Jones

Journal of Scientific Instruments, London, vol. 8, No. 2, 1931, pp. 34-44.

A series of physical instruments recognized as valuable aids in the search both for mineral deposits directly, and for structural features which may be favorable to mineral accumulation is described.

The instruments are divided into four main groups, characterized as gravitational, magnetic, seismic, and electrical, in relation to the particular physical magnitudes of which each group serves to measure the variation.

1. Gravity method. The Eötvös torsion balance, the balance improved by L. Örtling, and that improved by the author and Captain Shaw (manufactured by the Cambridge Instrument Co., Ltd.) are described and photographs of them are given.

2. Magnetic method. Dip needle devised by Lloyd, Schmidt's portable vertical variometer, and a portable horizontal variometer devised by Walker are mentioned.

3. Seismic method. Mechanisms for amplifying a vibration are explained and the question as to how this type of apparatus can be used in prospecting is considered. A seismograph manufactured by the Cambridge Instrument Co. is demonstrated.

4. Electrical method. Three methods (potential, resistivity, and electromagnetic) are discussed, and the apparatus used is explained.--W. Ayvazoglou.

8. GEOLOGY

(343) THE SALT-DOME AREA WEST OF CELLE, GERMANY

By Carl Schmidt

The Petroleum Times, London, vol. 25, No. 638, 1931, p. 508.

Notwithstanding the numerous boreholes that had been sunk, very little
s known about the actual size and shape of the two salt domes (Wietze and
bühren) of the north German plain. The questions whether these domes were
parated from each other or whether there was a connection between them had
t been determined. In order to decide this question seismographical inves-
gations were carried out. The question for determining the actual size and
ape of the domes had been solved by seismic, as well as gravimetric,
vestigations.

These investigations carried out in the area of Wietze-Hambühren-Wittbeck-
lthausen-Meissendorf revealed unexpected and very important geological con-
tions. It was determined that:

1. Instead of there being two domes there was in fact only one large
e.

2. That part of the dome around Hambühren was much larger and had an en-
rely different shape than was anticipated.

3. In the direction of the south southwest-north northeast prolongation
the Hambühren dome there was another salt upthrust.

4. The dome of Meissendorf at its southern part had an elongation toward
e southeast in the east southeast-west northwest direction.

The results of geophysical investigations also confirmed the importance
the two tectonic lines of dislocation, in directions mentioned in 3 and 4,
the underground structures of the north German plain, and showed that the
currence of salt upthrusts was connected with such lines of tectonic dis-
cation, especially with the intersections of the predominant striking
rections.—W. Ayvazoglou.

9. NEW BOOKS

(344) Edge, A. B. Broughton, and Laby, T. H. Principles and practice of geophysical prospecting. Edited by Edge and Laby. Pp. XIV + 380. With 261 illustrations in the text. Price, 15 s. net. Cambridge University Press, London, Fetter Lane, E. C. 4; New York, Toronto, Bombay, Calcutta, Madras. MacMillan, 1931. A report of the Imperial Geophysical Experimental survey.

(345) Emmons, William Harvey. Geology of petroleum. 736 pages, 435 illustrations. McGraw-Hill Book Co., 1931, New York City. Price, $6. The work may be broadly divided into two sections. One of these deals with the general principles of oil geology. The second section describes the features of the main oil fields of the world, and gives innumerable references. The book is profusely illustrated.

(346) Kaiser, August. Beitrage zur Physikalischen Erforschung der Erdrinde, Heft 2: Magnetische Messungen in Nordwestdeutschland. (Report on physical research in the earth crust. Part 2: Magnetic measurements in northwest Germany.) 50 pages, 3 tables, 5 figures. Issued by the Preussische Geologische Landesanstalt, Berlin, 1930, Price, R.M. 7.50.

10. PATENTS

(347) GRAVITATIONAL BALANCE

K. D. Sabaneev

Russian patent 14,274 Patent issued March 31, 1930.

The gravitational balance described in this patent is put under a bell from which the air can be partly exhausted; a special arrangement for reading is made and a polished ball, serving as an artificial illuminating point, is used for photographic recording of the indications of the balance.

Claims allowed - 3.

(348) SEISMOGRAPH

G. M. Polonsky and V. G. Leshchinsky

Russian patent 15,527 Patent issued May 31, 1930.

The construction of the seismograph disclosed in this patent is characterized by the application of a Rochelle salt plate secured in an isolated holder and connected by one end with the net of an amplifying lamp and by the other end with the ground and one pole of the battery producing the glowing of the lamp, in the anode circuit of which an electric recording apparatus is inserted.

Claims allowed - 1.

(349) APPARATUS FOR TESTING THE RADIOACTIVITY OF ROCKS

M. J. Sumgin

ssian patent 16,787 Patent issued Sept. 30, 1930.

The apparatus described in this patent and assigned for testing the
dioactivity of rocks consists of a hollow cylinder in the lower end of which
ovable bottom of the form of a truncated cone, turned with its top downward,
inserted; the walls of this cone are covered with a thin layer of zinc
phide or platinocyanide barium; the bottom has an opening in which a plate
signed for carrying the sample of the rock to be investigated is inserted;
e upper end of the cylinder has a cover provided with a microscope serving
r observation.

Claims allowed - 1.

(350) METHOD OF CONTOURING ORE DEPOSITS

L. N. Bogoiavlensky

ssian patent 12,953 Patent issued Jan. 31, 1930.

The method of contouring ore deposits disclosed in this patent is
racterized by the following proceeding: At the points of a net plotted on
e terrane, the "half value period" of the decay of any radioactive matter
determined, then the points with equal values of these points are connected
curves; based on the form of the curves having equal "half value periods"
the decay, the contour of the ore deposit by which the change of the half
ue period of the decay is caused is drawn on a plane.

Claims allowed - 1.

(351) METHOD OF PROSPECTING FOR ORE

A. G. Tarkhov

ssian patent 17,515 Patent issued Sept. 30, 1930.

The method described in this patent in which heterodine is used, based on
e property of changing one of its contours under the influence of ore de-
sits, is characterized by an arrangement such that the antenna connected with
e of the contours of the heterodine is placed inside of a metallic screen,
e latter being provided with a slot. In adjusting the apparatus the slot
covered with a metallic plate. The screen can be rotated by means of a de-
ce operated by hand. After the adjustment of the apparatus for the investi-
tion of the ground (disappearing of sound in the telephone) the slot is
ened and the screen rotated. The appearance of a sound in the telephone
ows that in the direction of the slot there is an ore deposit.

Claims allowed - 2.

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INFORMATION CIRCULAR

DEPARTMENT OF COMMERCE - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS[1]

No. 29

Compiled by Frederick W. Lee[2]

1. Patents (Gravitational and Magnetic methods)

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The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6559."

Senior physicist, U. S. Bureau of Mines.

This information circular contains abstracts, by W. Ayvazoglou, from original German patents concerning gravimetrical and magnetic methods of geophysical prospecting.

Copies of the patents listed in this circular may be procured from Deutsches Reich, Reichspatentamt, Berlin, Germany.

1. GRAVITATIONAL METHODS

(352) EÖTVÖSSCHE DREHWAAGE
(Eötvös' Torsion Balance)

Werkstätten für Präcisions - Mechanik und Optik
Carl Bamberg, of Berlin-Friedenau.

343,620 Patent issued November 5, 1921.

The invention disclosed in this patent concerns the recording apparatus which is secured on the top of the vertical protecting box. By a special arrangement the light ray reflected by the mirror suspended from the filament i conducted vertically upward by means of an additional mirror, and can be observ through a window.

Claims allowed - 3.

(353) EÖTVÖSSCHE DREHWAAGE
(Eötvös' Torsion Balance)

(Addition to patent 343,620)

Askania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau,
of Berlin-Friedenau.

372,133 Patent issued March 24, 1923.

This patent concerns an improved means of conducting the light ray, as described in the original patent 343,620.

According to this patent the light ray is projected first to a mirror secured as low as possible and then reflected by another mirror to the recording apparatus situated at the top of the protecting box.

Claims allowed - 2.

(354) EÖTVÖSSCHE DREHWAAGE
(Eötvös' Torsion Balance)

kania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau,
of Berlin-Friedenau.

8,323 Patent issued July 10, 1923.

The invention disclosed in this patent is an arrangement by which the ocking device and the trip gear mechanism serving for the rotation of the lance is connected to a braking or locking device of the driving mechanism in ch a way that they both work simultaneously, thus causing the driving echanism to stop as soon as the rotation of the instrument is locked.

Claims allowed - 2.

(355) EINRICHTUNG ZUM MESSEN VON WINKELAUSSCHLAGEN
(Arrangement for measuring angles of deflection)

Gesellschaft für praktische Geophysik m. b. H. of Freiburg i. Br.

35,787 Patent issued December 12, 1923.

An arrangement is described for measuring angles of deflection by means of mirror and a graduation scale in geophysical-survey instruments, such as orsion balances, in which the graduation scale is fixed to the telescope ove the tube; a cut-away section of the telescope tube in front of the objective makes possible the passage of the light rays, emanating from the scale hrough the objective to the mirror and back to the eye.

Claims allowed - 2.

(356) EINRICHTUNG ZUR RELATIVEN SCHWEREMESSUNG
(Arrangement for relative gravity measurement)

Dr. Wilhelm Hammer of Freiburg i. Br.

91,777 Patent issued March 11, 1924.

This patent discloses an arrangement in which the periods of oscillation f two or more pendulums assigned for relative gravity measurements are transmitted by radio. According to this invention, the pendulums, the periods of scillation of which are to be compared, are connected to oscillatory circuits, he emission of waves of which during an oscillating phase of pendulums is uddenly changed; this makes possible the noting of coincidences at the places f observation.

Claims allowed - 2.

(357) DREHWAAGE
(Torsion Balance)

Askania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau,
of Berlin-Friedenau

394,876 Patent issued April 29, 1924.

The purpose of the invention described in this patent consists of making th time during which the oscillating beam comes to rest adjustable according to circumstances. The damping device serving for this purpose is described.

Claims allowed - 2.

(358) EÖTVÖSSCHE DREHWAAGE
(Eötvös' Torsion Balance)

Askania-Werke A.-G., vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau,
of Berlin-Friedenau.

395,397 Patent issued May 16, 1924.

The Eötvös torsion balance described in this patent is characterized by an arrangement in which the influence of changes of temperature and of radiation is removed by filling the external casings protecting the balance with soft feather these casings serve at the same time for protecting the balance during transportation.

Claims allowed - 4.

(359) DREHWAAGE ZUR MESSUNG DER SCHWERKRAFT
(Torsion Balance for Measuring Gravity)

Askania-Werke A.-G., vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau,
of Berlin-Friedenau.

396,181 Patent issued May 27, 1924.

This patent discloses an invention in which the beam of the balance is made of a new form so that one of the weights is disposed below and the other above the horizontal plane passing through the point of suspension. By this arrangement the height of the instrument can be reduced.

Claims allowed - 3.

(360) GRAVITATIONSWAAGE NACH ART DERJENIGEN VON EÖTVÖS
(Torsion Balance of Eötvös Type)

Gesellschaft fur praktische Geophysik m. b. H. in Freiburg i. Br.

3,284 Patent issued May 7, 1925.

The torsion balance of Eötvös type described in this patent discloses an
vention by which the variability of the twisting force is eliminated by pro-
cing in the torsion balance directing forces based on magnetic, electrical,
mass attraction. By this the external influence upon the suspension fibre--
r example, that of temperature--is also excluded.

Claims allowed - 2.

(361) EINRICHTUNG ZUM MESSEN KLEINER KRÄFTE
(Arrangement for Measuring Small Forces)

"Exploration" Boden-Untersuchungs und Verwertungs-G. m. b. H. of Charlottenburg.

6,319 Patent issued July 11, 1925.

The measuring of small forces by means of a balance beam fastened rigidly
a torsion filament, as described in this patent, is characterized by the
llowing special arrangement: The beam is fixed to the upper part of the fila-
nt; the lower part of the torsion filament is secured to a rod, the ends of
ich are inserted into special guides allowing the rod to be moved in vertical
rection only. The same rod serves for keeping the filament tight.

Owing to this arrangement the height of the whole instrument is reduced
nsiderably.

Claims allowed - 3.

(362) EÖTVÖSSCHE DREHWAAGE
(Eotvos Torsion Balance)

"Erda" A.-G., Institut für Angewandte Geophysik of Göttingen.

8,348 Patent issued August 31, 1925.

The invention disclosed in this patent is characterized by the suspension
the beam to a unicrystal filament--for example, a tungsten wire.

Claims allowed - 1.

(363) TORSIONSAUFHÄNGUNG
(Torsion suspension)

"Erda" A.-G. of Göttingen

421,726 Patent issued November 17, 1925.

This patent discloses a torsion suspension as follows: The filament passes through a hollow cylinder made from a soft metal--for example, lead; the cylinder is inserted into a clamping screw; the suspension wire can be held fast by applying a screw.

Claims allowed - 1.

(364) DREHWAAGE
(Torsion Balance)

"Erda" A.-G. of Göttingen.

421,727 Patent issued November 17, 1925.

This patent describes an arrangement by which the damping of the oscillation of the beam is obtained by using the air; for this purpose the weights are placed between two damping plates. The position of these plates, thus the amount of damping, can be regulated by means of special guide screws.

Claims allowed - 4.

(365) DREHWAAGE ZUR FESTSTELLUNG NUTZBARER LAGERSTÄTTEN
(Torsion Balance for the Determination of Ore Deposits)

Dr.-Ing. Heinrich Quiring of Falkensee b. Spandau.

423,312 Patent issued December 24, 1925.

The torsion balance for the determination of ore deposits and other gravity disturbances under the ground, as well as above it, described in this patent, is characterized by an arrangement by which the deflections of the balance beam are established by magnetic or electrical potential differences occurring between the balance beam, suspension wires of the weights, and the weights on the one side, and the nonconductors or conductors of the form of a tube, ring, box, or plate enclosing them on the other side.

The measurements of the deflections of the beam are made by means of a plate condenser.

Claims allowed - 2.

(366) VERFAHREN FÜR SCHWEREMESSUNGEN NACH EÖTVÖS

(Method of Gravity Measurements according to Eötvös)

Dr. Karl Kilchling of Freiburg i. Br.

427,530 Patent issued April 9, 1926.

This patent discloses a method of gravity measurements according to Eötvös in which the torsion balance is very slowly rotated without interruption by means of a precision watch. During this constant mechanical rotation the ocular or photographic observation can be carried out in as many azimuth positions as desired.

Claims allowed - 1.

(367) PLATTEN KONDENSATOR ZUM BESTIMMEN VON MASSEN GRAVITATIONSWIRKUNGEN

(Plate condenser for determining the gravitational effects of masses)

Dr.-Ing. Kurt Emil Dittmann of Gelsenkirchen.

428,499 Patent issued May 14, 1926.

This patent describes a plate condenser assigned for determining the excess or deficiency of mass under the ground or inside of other bodies; the invention is characterized by making the condenser rotatable around a horizontal and a vertical axis so that it can be adjusted to any position of the angle; the direction, as well as the various strengths of the effects by which the movable condenser plate is influenced according to the laws of mass attraction, can be measured.

Claims allowed - 1.

(368) VERFAHREN ZUR VERSTÄRKUNG DER DREHWAAGENAUSSCHLÄGE DURCH RESONANZ

(Method for amplifying the deflections of the torsion
balance beam by resonance)

Dr. Karl Kilchling of Freiburg i. Br.

428,500 Patent issued May 5, 1926.

The method for amplifying the deflections of the torsion balance beam by resonance, described in this patent, concerns an arrangement by which the period of time of uniformly rotating balance and the torsion oscillation of the suspension are mutually adjusted.

Claims allowed - 1.

(369) METALLDRAHTAUFHÄNGUNG FÜR MESS-INTRUMENTE INSBESONDERE FÜR DREHWAAGEN

(Metal-wire suspension for measurement instruments,
especially for torsion balances)

Käte Heckmann of Freiburg i. Br.

428,824 Patent issued May 14, 1926.

This patent discloses a metal-wire suspension for measurement instruments, especially for torsion balances, characterized by providing the part of the instrument enclosing the suspension wire with a heating device which can be used for tempering the suspension wire.

Claims allowed - 1.

(370) VERFAHREN UND VORRICHTUNG ZUR FESTSTELLUNG NUTZBARER LAGERSTÄTTEN UND SONSTIGER SCHWERESTÖRUNGEN DURCH LOTABWEICHUNGEN

(Method and apparatus for locating useful deposits and determining
gravity disturbances by means of plumb-line deviations)

Dr.-Ing. Heinrich Quiring of Falkensee b. Spandau.

429,034 Patent issued May 17, 1926.

The method for locating ore deposits or determining gravity disturbances above the ground and under the ground, described in this patent, discloses an arrangement by which the plumb-line deviations are determined by measuring electrical or magnetic potential differences between the plumb line and a conducting or nonconducting body surrounding the plumb line. This body may have a form of a sphere, cylinder, ring, plate, or have a convex shape. The ring or the cylinder is divided into segments, each representing a plate condenser.

Claims allowed - 3.

(371) VORRICHTUNG ZUM BEOBACHTEN DER ÄNDERUNG EINZELNER SCHWERKRAFTS-KOMPONENTEN MITTELS ELEKTRISCHER PLATTENKONDENSATOREN

(Apparatus for observing the change of single gravity
components by means of electrical plate condensers)

"Exploration" Boden-Untersuchungs - und Verwertungs G. m. b. H. of Berlin.

430,643 Patent issued June 21, 1926.

The apparatus for observing the change of single gravity components by means of electrical plate condensers, described in this patent, consists of one or several condensers suspended in such a manner that they occupy a position eccentrical with regard to a vertical or horizontal axis of rotation.

Claims allowed - 1.

(372) HORIZONTALPENDELDREHWAAGE
(Horizontal pendulum torsion balance)

Seismos G. m. b. H. of Hannover

432,022 Patent issued July 22, 1926.

This patent discloses the application of the horizontal pendulums, for example, of Hengler's type, for gravity field investigations. A detailed description of the apparatus is given. In order to reduce the time of observation, two apparatuses placed opposite one another may be used.

Claims allowed - 4.

(373) VERFAHREN FÜR SCHWEREMESSUNGEN NACH EÖTVÖS
(Method of gravity measurements according to Eotvös)

(Addition to patent 427,530)

Dr. Karl Kilchling of Freiburg i. Br.

432,023 Patent issued July 28, 1926.

The method described in this patent differs from that of the original patent 427,530 by an arrangement in which only the suspended part is rotated and the deviation of attraction is observed, with regard to the azimuth of the rotation, during the rotation.

Claims allowed - 4.

(374) VERFAHREN ZUR BESTIMMUNG DER ANZIEHUNG VON MASSEN, INSBESONDERE DER ERDANZIEHUNG

(Method for determining the attraction of masses, especially that by the earth)

"Exploration" Boden-Untersuchungs - und Verwertungs-G. m. b. H. of Berlin

432,130 Patent issued July 28, 1926.

The invention discloses the following method for determining the attraction of masses. A system of bodies of masses is enclosed in a box provided with a pressure meter. The system is subject to changes of position, if the force of attraction under the effect of which the masses of the system are is changed. The system is brought then to its original position by the change of the density of the medium in which the system is inclosed. The value of this variation of density can be established by means of a pressure-meter and serves as a basis for determining the change of the force of attraction.

Claims allowed - 3.

(375) VERFAHREN FÜR SCHWEREMESSUNGEN NACH EÖTVÖS
(Method of gravity measurements according to Eötvös)

(Addition to patent 427,530)

Dr. Karl Kilchling of Freiburg, i. Br.

432,185 Patent issued July 28, 1926.

This addition to the original patent 427,530 discloses an invention by which a light ray is rotated together with the torsion balance; this light ray records the deviation of the attracted suspended part with regard to the azimuth of the uniform rotation. The recording is produced in the form of a curve or the light ray is exposed by a mechanical device at fixed periods of time in such a way that it serves as a time signal by which the elements of the movement of the rotation of the suspended part are recorded.

Claims allowed - 3.

(376) VORRICHTUNG ZUR VERMEIDUNG DES KLEBENS DER GEHÄNGE BEI MESSINSTRUMENTEN, BESONDERS DREWAAGEN

(Arrangement for avoiding the adhesion of the suspension part in measuring instruments, especially torsion balances)

Dr. Johann Koenigsberger of Freiburg i. Br.

432,598 Patent issued August 7, 1926.

This patent discloses a means for preventing the suspension part of a measuring instrument from adhering to other parts with which it makes contact during its oscillation; this result is attained by making the parts which come in contact from hard oxides or sulphides on the one hand and from metals or metallic alloys on the other; owing to this arrangement the parts which come in contact, instead of adhering, repel each other.

Claims allowed - 1.

(377) TEMPERATURSCHUTZ FÜR MESSINSTRUMENTE ALLER ART
(Temperature protection of measuring instruments of all kinds)

Alfred Gawron of Berlin-Wilmersdorf.

436,592 Patent issued November 4, 1926.

The invention discloses a special method of temperature protection; the protection consists of several separated covers having a form corresponding to the parts of the torsion balance or of any other measurement instrument. The covers are made from waterproof material and are provided with openings through which the observations can be made without removing the covers.

Claims allowed - 1.

(378) GEHÄNGEKLEMMVORRICHTUNG FÜR TORSIONS INSTRUMENTE
(Locking device for the suspension parts of torsion instruments)

Dr. Johann Königsberger of Freiburg i. Br.

37,215 Patent issued November 19, 1926

This patent discloses the construction of a locking device in which the uspension wire remains stretched after the instrument is locked for transportaion. By this arrangement, which consists of applying a spring producing a orce almost equal to that of the weight of the mass, the change of the position f the zero point after the unloading of the instrument is prevented.

Claims allowed - 1.

(379) DREHWAAGE FÜR AUSFÜHRUNG VON SCHWEREMESSUNGEN
(Torsion balance for carrying out gravity measurements)

"Exploration" Boden-Untersuchungs-und Verwertungs-G. m. b. H. of Berlin.

40,384 Patent issued February 17, 1927.

The torsion balance proposed by the inventor is characterized by placing he rotative driving mechanism, in order to preserve a symmetrical distribution f the mass of the instrument, in a central position--for example, inside of he cylinder of the foot.

Claims allowed - 1.

(380) VERFAHREN ZUR UNTERSUCHUNG DER RÄUMLICHEN DICHTEVERTEILUNG IM ERDINNERN
(Method for investigation of spatial distribution of density inside of the earth)

Seismos G. m. b. H. of Hannover.

41,170 Patent issued March 1, 1927.

In order to obtain greater accuracy in investigating--for example, by orsion balance--of spatial distribution of density in the surroundings of alleries and workings of mines and determining the position of ore deposits he density of which differs from the surroundings, the inventor proposes that he center of gravity of the suspension part of the instrument be brought to hat point of the cross section of the gallery in which the forces of attraction f the parts of the masses mutually compensate each other.

Claims allowed - 2.

(381) FADENLOSE AUFHÄNGUNG VON DREHWAAGEN, HORIZONTAL PENDELN, MAGNETOSKOPEN UND DGL.

(Wireless suspension of torsion balances, horizontal pendulums, magnetoscopes, and similar instruments)

Reinhard Reeh of Nenzebach, near Dillenburg.

441,505 Patent issued March 10, 1927.

The patent describes a wireless suspension of torsion balances, etc., accomplished by means of a swimmer immersed in a liquid; the invention is characterized by such a choice of the liquid, of the inclination, and the natur of the surface parts of the swimmer, and of the walls of the receptacle at the level of the liquid, that two different menisci are formed in the circular space between the immovable receptacle and the movable swimmer.

Claims allowed - 10.

(382) MESSINSTRUMENT MIT FLÜSSIGKEITS-DÄMPFUNG

(Measurement instrument with liquid damping)

Dr. Johann Königsberger of Freiburg i. Br.

441,882 Patent issued March 16, 1927.

The liquid damping for measurement instruments described in this patent is characterized by making the suspension wire of the damping body thinner at the place in which the wire crosses the surface of the liquid; by this the effect of the surface tension is lessened considerably.

Claims allowed - 1.

(383) VERFAHREN ZUR BESEITIGUNG STÖRENDER WANDUNGSHOHLRÄUME U. DG. BEI BENUTZUNG DER DREHWAAGE UNTER TAGE

(Method for eliminating disturbing hollow spaces in walls in using the torsion balance underground)

Gesellschaft fur praktische Geophysik m. b. H. of Freiburg i. Br.

443,215 Patent issued April 23, 1927.

This patent discloses a method for eliminating hollow spaces in walls of mines owing to their harmful effect on the measurements made under ground by torsion balance. The inventor recommends filling out these hollow spaces with material the density of which corresponds to that surrounding the hollow space. Sacks filled with such material may be used.

Claims allowed - 2.

(384) VERFAHREN ZUR BESEITIGUNG STÖRENDER WANDUNGS-HOHLRÄUME UND DGL. BEI BENUTZUNG DER DREHWAAGE UNTER TAGE

(Method for eliminating disturbing hollow spaces in walls in using the torsion balance under ground)

Gesellschaft für praktische Geophysik m. b. H. of Freiburg i. Br.

43,299 Patent issued April 23, 1927.

In this addition to the original patent 443,215, concerning the filling ut of hollow spaces in walls in working with torsion balance underground, the nventor states that the filling can be made not only in the form of plane urfaces, as recommended in the original patent, but also in any other form or which the gravity effect may easily be calculated, as for example, the orm of a cylinder.

Claims allowed - 1.

(385) VORRICHTUNG ZUR BESTIMMUNG DER ÄNDERUNG DER VERTIKAL-KOMPONENTE DER ATTRAKTIONSKRAFT IN DER VERTIKALRICHTUNG

(Device for determining the variation of the vertical component of gravity of the force of attraction in vertical direction)

Gesellschraft für praktische Geophysik m. b. H. of Freiburg i. Br.

48,003 Patent issued August 6, 1927.

The device for measuring the deviation of the vertical component of ravity, described in this patent, consists chiefly of a beam kept in horiontal position by means of a horizontal wire; the weights are suspended to he ends of the beam at different heights. The local variation of the vertical omponent of gravity is manifested by the inclination of the beam and is easured by means of a mirror and a telescope. Two beams may be secured to the ame wire or to two wires, the weights of the two beams being fixed at opposite eights; both beams are provided with mirrors.

Claims allowed - 3.

(386) DREHWAAGE ZUR MESSUNG DER SCHWERKRAFT

(Torsion balance for measuring gravity)

(Addition to patent 396,181)

skania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg -Friedenau of Berlin-Friedenau.

51,477 Patent issued October 27, 1927

The original patent 396,181 discloses an invention in which the weights re fixed to the ends of the beam, one below and the other above a horizontal plane passing through the point of suspension of the beam. The invention described in this additional patent concerns the means by which the rotation of the beam around its own axis, thus causing the tilting of the perpendicular rods to one or the other side, is prevented.

Claims allowed - 7.

(387) DREHWAAGE
(Torsion balance)

Askania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau
of Berlin-Friedenau.

452,040 Patent issued November 3, 1927.

This patent discloses a combination of a torsion balance with a theodolite. The theodolite may be secured to the torsion balance either between the two casings of the two balance beams, or above the common casing in which the two beams are enclosed. The torsion balance can easily be removed and the theodolite used separately.

Claims allowed - 4.

(388 EÖTVÖSSCHE DREHWAAGE
(Eotvos' torsion balance)

(Addition to patents 343,620 and 372,133)

Askania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau
of Berlin Friedenau.

453,438 Patent issued December 6, 1927.

This patent concerns an improvement of the recording apparatus described in patents 343,620 and 372,133. In order to prevent the obscurity of the reading caused by the interference of the two light rays reflected by the mirrors, a special arrangement is made by which one of the light rays is screened at the moment when the other ray is used for taking the indication.

Claims allowed - 4.

(389) VERSCHLUSS FÜR FLÜSSIGKEITS DÄMPFUNGSGEFÄSS
(Device for closing liquid-damping receptacle)

Dr. Johann Königsberger of Freiburg i. Br.

3,720 Patent issued December 15, 1927.

The device for closing liquid-damping receptacles used in measuring struments (magnetometers, torsion balances) described in this patent, consts of one or several iris diaphragms and a rubber ring through which the re passes. By closing the diaphragm the rubber ring is compressed, thus eventing the flowing out of the liquid.

Claims allowed - 2.

(390) DREHWAAGE
(Torsion balance)

kania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau
of Berlin-Friedenau.

6,039 Patent issued February 15, 1928.

The invention discloses a system of damping by means of electromagnets; e arrangement for producing the damping magnetic field is connected with e torsion balance box; a weight fixed to the horizontal arm serves as a ake copper. The copper weight has the form of a parallelepiped, the ngitudinal axis of which is perpendicular to the axis of the beam.

Claims allowed - 3.

(391) GRAVITATIONS-MESSER ZUR MESSUNG DES VERTIKALEN GRADIENTEN DER ERDSCHWERE

(Gravity measuring instrument for measuring the vertical gradient of gravity)

Dr. Wilhelm Schweydar of Potsdam.

56,484 Patent issued February 25, 1928.

The invention concerns an apparatus for measuring the vertical gradient f gravity which is based on the comparison of the bifilar twisting moment of ravity with the torsion moment of a spiral spring. To eliminate the influence aused upon the length of the spiral spring by temperature changes this patent iscloses an arrangement in which the spiral spring is replaced by a wire, the pper end of which is carried by a balance beam brought to the horizontal osition by means of a counterweight.

Claims allowed - 3.

(392) DREHWAAGE NACH EÖTVÖS
(Torsion balance according to Eötvös)

Dr. Stefan Rybar of Budapest.

458,354 Patent issued April 4, 1928.

This patent describes a torsion balance according to Eötvös with a photographic registering device. The improvement concerns an arrangement by which the sensitive plates are secured below the measuring pendulu .

Claims allowed - 3.

(393) EINRICHTUNG ZUM EINSTELLEN DES AZIMUTS BEI DREHWAAGEN
(Device for adjusting the azimuth at the torsion balances)

Gebrüder Haff Ges. m. b. H. of Pfronten-Ried.

458,555 Patent issued April 13, 1928.

To adjust a torsion balance to various azimuths, ordinary stop screws or a ring provided with cuttings are generally used. This requires troublesome operation if, for example, five azimuths instead of three are to be taken. This disadvantage is according to this patent removed by applying two or several rings provided with cuttings which are fixed to a tube and can be displaced in vertical direction.

Claims allowed - 2.

(394) DREHWAAGE NACH EÖTVÖS
(Torsion balance according to Eötvös)

Dr. Karl Kilchling of Freiburg i. Br.

458,556 Patent issued April 13, 1928.

This patent describes an arrangement by which the torsion-balance box is suspended to a holder by a wire, thus making its special adjustment to horizontal position by means of levels unnecessary.

Claims allowed - 3.

(395) DREHWAAGE ZUM MESSEN KLEINER GRAVITATIONS KRÄFTE
(Torsion balance for measuring small gravity forces)

"Exploration" Boden-Untersuchungs-und Verwertungs-G. m. b. H.
of Berlin.

3,128 Patent issued July 24, 1928.

According to this invention one of the two weights of the balance is cured to a rigid rod directed upward, the other weight remaining as usual the end of the balance beam. By this arrangement the total height of the strument is considerably reduced.

Claims allowed - 2.

(396) DREHWAAGE ZUM MESSEN KLEINER GRAVITATIONS KRÄFTE
(Torsion balance for measuring small gravity forces)

(Addition to patent 463,128)

"Exploration" Boden-Untersuchungs-und Verwertungs-G. m. b. H.
of Berlin.

63,673 Patent issued July 31, 1928.

This patent discloses a further improvement of the original patent 63,128, which is characterized by lowering the center of gravity of the ystem by securing a special weight below the center of the balance beam. his arrangement makes it possible to reduce still more the total height of e balance.

Claims allowed - 2.

(397) DREHWAAGE FÜR GRAVIMETRISCHE UNTERSUCHUNGEN
(Torsion balance for gravimetrical investigations)

Ervand Kogbetliantz of Paris.

67,248 Patent issued November 13, 1928.

This patent discloses a torsion balance provided with three beams secured t equal angles one to another and suspended to a common wire.

Claims allowed - 3.

(398) DREHWAAGE ZUR MESSUNG VON SCHWERKRAFTS-UNTERSCHIEDEN
(Torsion balance for measuring gravity variations)

"Exploration" Boden-Untersuchungs-und Verwertungs-G. m. b. H.
of Berlin.

467,704 Patent issued October 29, 1928.

The torsion balance described in this patent is constructed so that the two horizontal bars, to which the weights are secured are connected one with another by a vertical cross arm. This cross arm is suspended to the wire directly or by means of a lateral additional piece. The connecting arm can be made from a tube and the suspension wire placed inside of the tube; the center of gravity can be lowered by fixing a special weight to the connecting arm or to the lower arm.

Claims allowed - 5.

(399) DREHWAAGE
(Torsion balance)

Askania-Werke A.-G. vormals Centralwerkstatt-Dessau und Carl Bamberg-Friedenau
of Berlin-Friedenau.

478,359 Patent issued June 24, 1929.

This patent discloses an improvement of the invention described in the original patent 456,039. The improvement concerns the annihilation of the effect of the magnetic remanence upon the brake copper after the closing of the circuit by which the results of the measurements are influenced.

Claims allowed - 4.

(400) VORRICHTUNG ZUR ANBRINGUNG VON BASISLINIEN AUF DEN PHOTOGRAMMEN WÄHREND DER PHOTOGRAPHISCHEN REGISTRIERUNG BEI DREHWAAGEN

(Device for drawing base lines on photograms obtained in
torsion balances during photographic recording)

Gebrüder Haff G. m. b. H. of Pfronten-Ried.

480,443 Patent issued October 17, 1929.

The device for drawing base lines on photograms is characterized by securing a special immovable lever, provided with a sharp point. By means of light pressure the point is pressed against the photographic surface and draws on it, owing to the movement of this surface, a fine line.

Claims allowed - 1.

(401) DREHWAAGE MIT ZWEI GEHÄNGEN
(Torsion balance with two suspensions)

"Exploration" Boden-Untersuchungs und Verwertungs-G. m. b. H. of Berlin.

82,886 Patent issued September 26, 1929.

The invention described in this patent concerns the arrangement by which the two beams of the torsion balance form one with another an angle of 90° or of nearly 90°.

Claims allowed - 1.

2. MAGNETIC METHODS.

(402) ERDMAGNETISCHES VERTIKAL-INTENSITÄTS-VARIOMETER
(Earth magnetic vertical-intensity variometer)

Otto Töpfer und Sohn, of Potsdam.

52,489 Patent issued June 21, 1904.

The patent involves a vertical-intensity variometer in which the magnet system, which is placed in the inclination line, is brought to a certain, for example, normal, position by the torsion of one or several horizontal filaments or wires.

Claims allowed - 1.

(403) VORRICHTUNG ZUM SCHUTZ DER AUF TORSION BEANSPRUCHTEN ACHSEN BEI MESSINSTRUMENTEN, INSBESONDERE FÜR ERDMAGNETISCHE BEOBACHTUNGEN GEGEN SCHNELLE TEMPERATURSCHWANKUNGEN

(Arrangement for protecting axles of measuring instruments based on torsion, especially those used for earth-magnetic observations, against quick changes of temperature)

"Erda" A.-G. of Göttingen.

411,093 Patent issued March 10, 1925.

According to the invention described in this patent, the influence of quick changes of temperature upon the wire or fibre used as a torsion axis is lessened by an arrangement in which such axes are surrounded with oil or similar poor heat conducting liquid.

Claims allowed - 1.

(404) INSTRUMENT ZUR MESSUNG SÄMTLICHER BESTIMMUNGSGRÖSSEN DES ERDMAGNETISCHEN FELDES

(Instruments for measuring the values of all the components necessary for determining the earth-magnetic field)

"Erda" A.-G. of Göttingen.

415,872 Patent issued July 2, 1925.

The instrument described in this patent serves for measuring the values of all the components necessary for determining the earth-magnetic field; it is characterized by an arrangement in which a magnetic needle, rotatable around a vertical axis, and serving for measuring the horizontal intensity and declination, is fixed above or below the magnetic vertical-intensity field balance in such a manner that the distance between the magnetic needle and the beam of the field balance can be adjusted.

Claims allowed - 2.

(405) VERFAHREN ZUR ANSCHAULICHEN WIEDERGABE VON MAGNETISCHEN FELDMESSUNGEN

(Method for apparent representation of magneti field measurements)

"Erda" A.-G. of Göttingen.

421,899 Patent issued November 20, 1925.

This patent describes a method of representing by small sticks the relat to each other of vectors of disturbance calculated for each point from measu values; these small sticks, by which the established values and directions are represented, are put at those points of the map or of the plastic model of the region under investigation which correspond to the points of observation on the terrain.

Claims allowed - 1.

(406) LOKALVARIOMETER FUR MAGNETISCHE KRAFTFELDER

(Local variometers for magnetic fields)

Dr. Hans Haalck of Berlin-Steglits.

426,772 Patent issued March 18, 1926.

The localvariometer for magnetic fields disclosed in this patent is characterized by an arrangement in which two or more coils, of equal area of turn are fixed and connected at different places of a common rotation axis n such a way that their areas of turn lie in the same plane and are directed arallel to the rotation axis, and that the alternating currents produced in hem during the rotation have opposite directions. The coils are moved by eans of a driving device.

Claims allowed - 2.

(407) VERFAHREN ZUR FESTSTELLUNG GERINGER LAGERVERÄNDERUNGEN VON KÖRPERN IM BEREICH VON KRAFTFELDERN

(Method for determining small changes of position of
bodies within the range of fields of force)

Dr.-Ing. Heinrich Quiring of Falkensee b. Spandau.

37,365 Patent issued November 16, 1926.

Method for determining small changes of positions of bodies, for example f a plumb line, within the fields of force is characterized by the following: n order to determine the electrical, magnetic, or any other physical potential ariation, or variation of oscillation caused by the change of the position of he body, the circuit which serves for measuring the change of the capacity, r of the oscillation, is closed only for a short period by utilizing the nertia of the measuring device and after this device is adjusted to the new osition of equilibrium.

Claims allowed - 1.

(408) MAGNETISCHES INSTRUMENT

(Magnetic instrument)

Ernst Ruhstrat of Göttingen.

40,899 Patent issued February 17, 1927.

This patent discloses a magnetic instrument, with two magnetic needles scillating horizontally, for measuring the horizontal intensity in which two irecting magnets are secured one above the upper needle and the other below the lower needle; the force of these magnets is calculated so that one needle is kept in a direction opposite to the earth's field and the other in the irection of the earth's field; the two needles are thus each in a weak field, f almost equal force but opposite direction, which is composed from the arth's field and directing field.

Claims allowed - 1.

(409) MAGNETISCHE WAAGE
(Magnetic balance)

Dr. Hans Haalck of Berlin-Steglitz.

441,171 Patent issued February 21, 1927.

The invention concerns a magnetic balance by which the measurements of the vertical intensity as well as of declination can be made with an accuracy equal to that of instruments generally used. The beam of the balance described in this patent consists of two or more magnetic systems crossing one another by any angle; the oscillation plane of the beam is made rotatable so that the adjustment of the balance beam to the zero position is possible.

Claims allowed - 1.

(410) VARIOMETER FÜR HORIZONTAL UND VERTIKALINTENSITÄT
(Variometer for horizontal and vertical intensity)

Ernst Ruhstrat of Göttingen

455,437 Patent issued February 1, 1928.

This invention concerns the development of the horizontal variometer with two magnetic needles. By this development the measuring of the vertical intensity is made possible also. Operating the apparatus is simplified besides.

Claims allowed - 2.

(411) MAGNETISCHES MESSINSTRUMENT
(Magnetic measuring instrument)

Ernst Ruhstrat of Göttingen

455,438 Patent issued April 5, 1928.

This patent discloses a development of the original patent 440,899 in which instead of two directing magnets only one is used. The directing magnet may be replaced by a coil through which a circuit produced by an adjustable direct current of a fixed direction and strength passes.

Claims allowed - 1.

(412) VORRICHTUNG ZUR VERKLEINERUNG DES TEMPERATUREIN-FLUSSES BEI MAGNETISCHEN WAAGEN

(Arrangement for diminishing the influence of temperature in magnetic balances)

"Exploration" Boden-Untersuchungs-u. Verwertungs-G. m. b. H.
of Berlin.

71,228 Patent issued January 30, 1929.

The invention for diminishing the influence of the temperature concerns an arrangement by which the reducing of the magnetic moment in case of the increase of the temperature is compensated in a simple way. This compensation is obtained by the displacement of the center of gravity of the balance beam closer to the point of support of the balance beam.

Claims allowed - 1.

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[1] - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U.S. Bureau of Mines Information Circular 6568."

[2] - Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(413) CORRECTION TOPOGRAPHIQUE RELATIVE A L'EMPLOI DE LA BALANCE DE TORSION

(TOPOGRAPHIC CORRECTION WITH RELATION TO THE USE OF THE TORSION BALANCE)

By C. Alexanian

Congrès International des Mines, Liège, 1930, June, Mémoire No. 36, pp.269-274.

The author describes a new and general method of topographic correction. The article consists of the following three headings:

1. Introduction.
2. Principle of the new method.
3. Mathematical consideration of the method.

The translation of the author's abstract reads as follows:

> The author proposes to apply for each section of topographic configuration around the torsion balance a well-defined hyperbolic paraboloid (minimum surface of the second degree); this makes possible a complete integration of expressions relative to this correction without the necessity of applying approximations admitted so far. For this purpose the formula used by Eötvös is only _a particular case_ of that proposed by the author.

Two figures and a number of tables which may be used by prospectors are added.--W. Ayvazoglou.

(414) GRAVIMÉTRIE DES FORMATIONS PETROLIFÈRES

(GRAVIMETRY OF PETROLEUM FORMATIONS)

By Arnaldo Belluigi

La Revue Pétrolifère, Paris, No. 417, 1931, pp. 405-411.

A detailed mathematical discussion on the effect of gravity on petroleum formations is given.

Graphical determination of gravimetric influences is explained.--W. Ayvazoglou.

(415) SCHWEREMESSUNGEN UND GEOLOGIE VON MITTELASIEN

(GRAVITY MEASUREMENTS AND GEOLOGY OF CENTRAL ASIA)

By Pavel Savitsky

Gerlands Beiträge zur Geophysik, Leipzig, vol. 30, No. 3/4, 1931, pp. 277-280.

By comparing the gravitation-stations with the geological maps of Central Asia the limits of areas with regard to gravimetrical data may be fixed as follows:

1. The Ferghana Valley is characterized by considerable negative anomalies, which can be attributed to the lowering of the rock layers caused by the compression of the earth crust owing to the pushing up of masses (Alaiden).

2. The region of the Karakul Lakes (Pamir) has positive anomaly, characteristic of plateaus.

3. Kalan-Wamar represents the most considerable negative anomaly in Central Asia.

4. The region of the Issyk-kul Lakes has positive anomaly, probably due to the great mass surplus below the bottom of the lake.

5. The Choresmic positive anomaly is caused by the presence of massive crystalline rocks.

6. The Krasnovodsk positive anomaly may be attributed to the extension of the intrusive and mass crystalline rocks.

The comparison of the value and of the sign of the anomalies with the age of the geological formation shows the prevalence of positive anomalies in the regions of the old and intrusive crystalline rocks and the predominance of negative anomalies in the regions with rock of later ages.--Author's abstract translated by W. Ayvazoglou.

(416) INTERPRÉTATION DES ANOMALIES GRAVIMÉTRIQUES ET MAGNÉTIQUES DE L'ALSACE

(INTERPRETATION OF GRAVIMETRIC AND MAGNETIC ANOMALIES IN ALSACE)

By J. Jung and C. Alexanian

Annales des Combustibles liquides, Paris, vol. 6, No. 1, 1931, pp. 43-58.

In the introduction to this article the authors observe that the study of gravimetric and magnetic anomalies of the earth's crust has been directed during the last years into two almost independent courses: The development of local geophysical prospecting for ore deposits, and the establishment of large nets of stations for obtaining data on physical properties of large areas and even of whole continents. In comparing these two courses with local topographic survey and a geodetic triangulation, the authors consider it evident that in the future the development of studies of regional geophysics will be brought into accord with the local geophysical investigation and will serve as a basis for this latter prospecting. As these conditions exist already, more or less, in Alsace the authors have chosen this country for examining the problem of interpretation of the gravimetric and magnetic anomalies of this area.

The question is discussed under the following headings:

1. Gravimetric and magnetic anomalies: Gravimetrical measurements used; measurement of density of rocks; corrections applied to the calculation of anomalies; new values of gravimetric anomalies (given in a table); new map of gravimetric isanomalies; magnetic measurements used; magnetic anomalies (shown in a table); a map of isanomalies of Z.

2. Comparison and significance of anomalies: Reason for gravimetric anomalies caused at great depth; anomalies of the supracrystalline origin in the Fossé Rhénan (Rhine Valley); anomalies of the infracrystalline origin in the Vosges; significance of magnetic anomalies; significance of magnetic and gravimetric anomalies; reason for infracrystalline anomalies; depth of basic infracrystalline; relation between the infracrystalline anomalies and the geology of the surface.

Four maps complete the article.--W. Ayvazoglou.

2. MAGNETIC METHODS

(417) ÜBER DIE ERMITTLUNG TEKTONISCHER LINIEN MITTELS DER MAGNETISCHEN FELDWAAGE IN GEBIETEN GERINGER UNTERSCHIEDE DER MAGNETISCHEN VERTIKALINTENSITÄT, IM BESONDEREN IN NORDDEUTSCHLAND

(ON THE DETERMINATION OF TECTONIC LINES BY MEANS OF A MAGNETIC FIELD BALANCE IN REGIONS WITH SMALL MAGNETIC VERTICAL-INTENSITY DIFFERENCES, ESPECIALLY IN NORTH GERMANY)

By E. Kohl

Kali und verwandte Salze, Berlin, vol. 25, Nos. 14, 15, and 16, 1931, pp. 209-215, 225-230, and 241-243

Based on a series of examples, described and illustrated in this article, Kohl draws the following conclusions:

> Summing up the results of a series of investigations, there is no doubt that the determination of the tectonic elements and lines in regions with small magnetic intensity differences, as for example in North Germany, is absolutely possible by using the present-day magnetic instruments. From a practical viewpoint this is important for the discovery of ore deposits connected partly with the tectonic lines or lying in the neighborhood of these lines. On the other hand, the magnetic method of prospecting may be of value to geology for making clear the tectonic

conditions in such areas the surface maps of which cannot serve the purpose owing to the coverings of younger periods and if there are no mines, as often happens in north Germany.

Although a scientist often refuses to accept the lines resulting from the sonomal maps, considering them to be of insufficient value for his purposes, hey still may give him valuable indications.

Distrust is often shown with regard to the accuracy of measurements ttainable. The reason is because the present-day instruments are much ffected by temperature variations, thus great care is required to obtain the ecessary accuracy of measurements. The new magnetic systems with improved emperature compensation, now under construction, will perhaps make it possible o attain the maximum accuracy more easily or even to increase the accuracy of easurements.--Author's abstract translated by W. Ayvazoglou.

3. SEISMIC METHODS

(418) SEISMIC PROSPECTING

By L. Don Leet

he Military Engineer, Washington, D. C., vol. 23, No. 130, 1931, pp. 326-330.

In a brief historical sketch the author mentions the first experimental eterminations of elastic-wave velocities made by R. Mallet (1856) and the evelopment of these experiments since 1913 (Reginald A. Fessenden). The iscoveries of salt domes in Texas, Louisiana, Oklahoma, and other States of he United States by seismic prospecting are noticed.

Basic theory of seismic prospecting, explanation of terms and formulas xpressing the velocities of the P-waves and S-waves are given.

The two next sections of the article deal with "Straight-line time-istance graphs" and "Curved time-distance graphs."

In discussing field procedure and large-scale prospecting, the author ives some figures of the cost of operating a standard seismic troop in the ulf Coast salt-dome area ($15,000 to $20,000 per month, the acreage covered n reconnaissance shooting being from 150,000 to 300,000 acres). Although he seismic method is so far used mainly for discovering salt domes, one ompany established last summer that by contouring the surface of a nepheline yenite batholith in Arkansas they could effectively prospect for bauxite, he ore of aluminum.

The predicted depth was computed as 218 feet ± 6 feet. The drill encountered syenite at 220½ feet. The seismographic computations, incidentally, howed also that there was a sudden change in material at 55 feet. At pproximately that depth, the drill reached the bottom of a loose sand and ncountered a wet, sticky clay. Therefore, there is no reason why the method an not, as a matter of regular production routine, locate similar abrupt velocity discontinuities with an error of less than 5 per cent. The possibility of application of the method in prospecting dam sites and building foundations is mentioned also.

In the last section, "Present status," the author says:

> Seismic prospecting has developed with amazing rapidity, but its growth has been neither healthy nor normal. It has reached a stage where it is imperative that some broad programs of university research be devoted to a solution of its problems, whether immediate financial returns from their solution seem likely or not.
>
> It must be recognized that seismic prospecting is not a separate and distinct branch. It is a tool for the geologist, and only as such can it attain any satisfactory degree of usefulness.--W. Ayvazoglou.

(419) SEISMOGRAPH WORK WITH EXISTING WELLS

By Burton McCollum and Wilton W. LaRue

The Oil and Gas Journal, Tulsa, Okla., vol. 30, No. 5, 1931, pp. 24, 81-82.

The authors explain some of the recent seismic methods for exploration of the territory surrounding the existent wells for very deep-seated domes. The principle of the method, consisting of running a detector of seismic waves to the bottom of a wildcat well, is explained.

In describing the practical utilization of the method the authors believe that in view of a very large number of wells now existing around various salt domes in the Gulf Coast, this method can be made very effective in exploring this region for domes to a substantially greater depth than has heretofore been possible by the usual surface method of operation. A diagram illustrates the method for deep exploration of regions surrounding known domes; diagrams also show the use of a well for profiling the mushroomed flank of a salt dome, for determining the position of a fault plane at various depths, and of exploring the side of a dome opposite a well for mushrooming.

A typical record made with the special seismic wave detector in a well at a depth of 6,690 feet and a shooting distance of 29,490 feet is given in a figure.--W. Ayvazoglou.

(420) THE FORMATION OF LOVE WAVES (QUERWELLEN) IN A TWO-LAYER CRUST

By Harold Jeffreys

Gerlands Beiträge zur Geophysik, Leipzig, vol. 30, No. 3/4, 1931, pp. 336-350.

The generation of S H and Love waves from an impulsive source is considered. It is found that the disturbance transmitted through the lower layer consists of a series of overlapping pulses, each starting at an instant orresponding to the time of transmission of a pulse that has undergone an tegral number of reflections in the upper layer. The recovery after each lse leads to a train of waves, the superposition of which gives the Love ves.--Author's abstract.

(421) SEISMOGRAMMFORMEN UND VORGÄNGE IM HERDGEBIET

(FORMS OF SEISMOGRAMS AND PROCESSES IN THE REGION OF THE EPICENTER)

By G. Krumbach

rlands Beiträge zur Geophysik, Leipzig, vol. 30, No. 3/4, 1931, pp. 351-365.

From a practical example, a Kamchatka earthquake, the author shows that in rtain epicenter regions very characteristic forms of seismograms appear even thin great periods of time and large regions of stations. To explain this enomenon the author examines the influence of the processes in the region of e epicenter in general and tries to coordinate the results obtained with the pinions on the origin of earthquakes.--Author's abstract translated by W. yvazoglou.

(422) ÜBER OBERFLÄCHENWELLEN

(ON SURFACE WAVES)

By Tokunosuke Itō

erlands Beiträge zur Geophsik, Leipzig, vol. 30, No. 3/4, 1931, pp. 366-407.

The author presents a detailed mathematical discussion on the following tems:

1. Deduction of fundamental relations in the visco-electric media.
2. Rayleigh-waves in visco-elastic media.
3. Love-waves in visco-elastic media.
4. Rayleigh waves in case of cooscillation of a retarding earth's crust layer in visco-elastic media.
5. Surface shearing waves in case of cooscillation of a retarding earth's crust layer in vicso-elastic media.
6. The influence of the overlying layer upon Rayleigh waves.
7. Dispersion of surface shearing waves with layers lying one above the other in visco-elastic media.--W. Ayvazoglou.

23) ON THE TRANSMISSION OF SEISMIC WAVES ON THE BOTTOM SURFACE OF AN OCEAN

By Katsutada Sezawa

lletin of the Earthquake Research Institute, Tokyo, vol. 9, No. 2, 1931, pp. 115-142.

1. The viscosity of water gives no influence upon the transmission of yleigh-type waves on the bottom surface of an ocean.

2. The compressibility of water is effective only on the movement of the superposed water, but not on the motion of the ground.

3. The pressure of the water in the sense of forming surface water waves is of a great importance in the transmission of the seismic waves.

4. The velocity of harmonic waves changes with the wave length, and this velocity is quick or slow according as the wave length is long or short. There is no definite critical velocity for harmonic waves of an infinite extent.

5. In a two-dimensional transmission of waves, the azimuthal component of the displacement of the solid as well as of the water becomes quiescent as the distance from the epicenter is increased.

6. For long waves, the ratio of the horizontal component of the displacement to the vertical component is larger than that of the ordinary Rayleigh waves, while this ratio is smaller than that of the latter for short waves.

7. The motion of the water particle is mainly of a vertical type.

8. However concentrated the original disturbance may be, the transmitted waves are of a dispersed form. As the distance from the epicenter is increased, this tendency becomes more distinct.

9. The dispersed waves are apparently of an oscillatory type, having a tail with gradually decreasing periods and amplitudes.

10. The leading part of the dispersed waves is propagated with the velocity of the ordinary Rayleigh waves.

11. The phase of the leading part changes as the waves proceed to a long distance.

12. The wave lengths of the oscillatory part become larger and larger and the forms of the waves are more and more flattened in the course of the progression of the disturbance.

13. The disturbed portion has various group velocities, depending upon the harmonic elements involved in that portion. The maximum of the group velocities is the same as that of Rayleigh waves, and this maximum velocity corresponds with the harmonic element of an infinitely long wave length.

14. The phase velocity is also variable for different parts of the disturbed waves.

15. When the effects of gravity and of water are omitted, the transmitted waves due to a concentrated disturbance are of a gradually subsiding type without oscillation.--Author's abstract.

(424) ETUDE PRELIMINAIRE SUR L'ACCELERATION DES SEISMES

(PRELIMINARY STUDIES ON THE ACCELERATION OF SEISMIC WAVES)

By Mishio Ishimoto

Bulletin of the Earthquake Research Institute, Tokyo, vol. 9, No. 2, 1931, pp. 159-166.

Ishimoto describes a new apparatus, constructed by him, assigned for studying seismic phenomena. Studies made by the author were limited to establishing characteristics of shocks from the viewpoint of acceleration. The apparatus was installed in the basement of the Institute and observations were made during a period of about four months.

Results of 24 observations are shown in a table and the reproduction of some typical seismograms is given. The author draws the conclusion that from the viewpoint of acceleration some new conceptions of seismic movements may be established; but they must be studied by using another method of registration, as the photographic method is, in the opinion of the author, unsatisfactory for this purpose.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(425) ÜBER DIE BERECHNUNG VON DEFORMIERTEN ELEKTROMAGNETISCHEN FELDERN IN DER GEOLEKTRISCHEN PROSPEKTION

(ON THE CALCULATION OF DISTORTED ELECTROMAGNETIC FIELDS IN GEOELECTRICAL PROSPECTING)

By A. Belluigi

Ergänzungshefte für Angewandte Goophysik, Leipzig, vol. 1, No. 4, 1931, pp. 363-372.

The magnetic field of two horizontal, balanced point charges on the surface of an infinite semispace is to be calculated. An interference for the lines of force is also arranged in the semispace. First, it is shown how the current distribution in the semispace is influenced by the interference. The field is then resolved into tubes of current, the deformation of the current potential is calculated, and from this the change in the tubes of current. From this change, according to Biot-Savart's law and by means of such graphic methods as used in gravimetrics, one derives the interfered, vertical components of the magnetic field; figure 1 gives the current strength of the individual tubes as ordinates; R : 1 as function of the abscissas. In Figure 2 the radii of the cross sections, the centers of which lie on the X-axis and through which 1/10, 1/20. ..... of the total current passes at intervals, are given as ordinates; the distance of the tubes of current from the center between the point charges is represented by the abscissa. Figure 3 gives the contribution of the various current lines to the components of the strength of the magnetic field.--Author's abstract.

(426) SULL' USO DI ELETTRODI DISSIMILI NELLA PROSPEZIONE GEOELETTRICA DEL SOTTOSUOLO

(ON THE USE OF DISSIMILAR ELECTRODES IN THE GEOELECTRICAL PROSPECTING OF THE SUBSOIL)

By Arnaldo Belluigi

Bollettino della Societa Geologica Italiana, Rome, vol. 50, No. 1, 1931, pp. 57-62.

Physical interpretation of the results of geoelectrical prospecting with alternating current by using dissimilar electrodes is explained.

A practical case which may frequently occur in the study of oil-bearing fields is discussed.--W. Ayvazoglou.

(427) EARTH RESISTIVITY SURVEYING

By G. F. Tagg

Engineering and Mining Journal, New York, vol. 131, No. 7, 1931, pp. 325-326.

A brief description is given of the earth resistivity method of geophysical surveying according to the system of measuring the specific resistance of homogeneous earth, described in the U. S. Bureau of Standards paper entitled "A method of measuring earth resistivity," by F. Wenner.

The interpretation of the results by the three different methods, (1) the empirical method, (2) the resistivity map method, and (3) the method of theoretical analysis, is explained.--W. Ayvazoglou.

(428) RESULTS OF ELECTRICAL RESISTIVITY AND ELECTRICAL INDUCTION MEASUREMENTS AT ABANA MINE, QUEBEC, CANADA

By E. Vernon Potter

U. S. Bureau of Mines, Technical Paper 501, Washington, 1931, 28 pp.

Contents:

Location and geology.
Mineralogy.
Acknowledgments.

Electrical resistivity surveys: Introduction; principle of methods; description of apparatus; precautions in using Megger; corrections for resistance in potential circuit; correction curves; plotting results; effect upon resistivity of geological discontinuity; choice of lines of observation; field observations.

Locating mineral deposits by alternating-current methods: Preliminary discussion; elliptical polarization; artificially produced fields; types of alternating current fields; field apparatus; circuit arrangement method of comparing major and minor axes of ellipse; field layout; interpretation of observations; determination of depth; sources of error; results of tests; comparison of methods.

The author discusses the theory as well as methods of surveying, illustrating the article with a series of figures. In comparing the two methods the author says:

> The two methods described in this paper are based on widely different principles, and each has its own special field of application. The resistivity method is necessarily slow, but very detailed results are obtainable from its correct use. The alternating-current method, however, is good for rapid work, but does not reveal the details, such as depth, slope, etc., nearly so well. A combination of two such methods should be very useful in making a survey over new country, the alternating current method being used for a preliminary survey and the resistivity method for a detailed survey in interesting points. Needless to say, both methods discriminate between differently conducting bodies which may or may not represent mineralization. These surveys are of value in districts in which, from a geological viewpoint, mineralizations are likely to occur.

Potter's paper is completed by F. W. Lee's article, "Explanation of some factors associated with induction method." The question is examined under the following items: Preliminary discussion; locus of magnetic field; mathematical relation between currents and magnetic fields; interrelation of parameters; specifications of measuring circuit; mathematical relations in measuring circuit; interpretation. Lee's summary of the article reads as follows:

> Summarized on very broad principles, the exciting loop carrying an alternating current may be considered a magnetic shell, the strength of which varies as the current changes in the wire. The direction and intensity of the field may be computed from elementary electrical formulas. This alternating magnetic shell energizes other magnetic shells in the ground by magnetic induction. If these other shells have sufficient strength they may be located by comparing their strength and direction to that of the main exciting shell. If the configuration of these detected shells have the proper geological forms or shapes for a certain district in that they may be associated with proper mineralization they should be more carefully investigated. On the other hand, erratic results may indicate conductors arising from water courses and other unconformities.

The bibliography on this subject is rather extensive and reference is here made to the Index to Geophysical Abstracts 1 to 20, prepared by the Geophysical Section of the U. S. Bureau of Mines and issued as Information Circular 6438.—W. Ayvazoglou.

5. RADIOACTIVE METHODS

(429) OBSERVATIONS ON THE PENETRATING RADIATION IN THE ANTARCTIC

By Kerr Grant

Nature, London, vol. 127, No. 3216, 1931, p. 924.

The author describes the observations upon the variation of intensity of the penetrating of cosmic radiation with latitude carried out by the British-Australian-New Zealand Antarctic Research Expedition during the recent summer cruise of the "Discovery," November, 1930, to March, 1931.

The apparatus employed was a Geiger-Müller electron tube counter, with single-stage amplifier, relay, and automatically recording chromograph.

Counts were obtained over a region ranging from Hobart to Adelie Land - that is, over a range of geographical latitude from 43° S. to 68° S.

The mean value (6.3 per minute) of all counts on the voyage is identical within the limits of experimental error with the value (6.1) obtained for a count of four hours in the physics laboratory of the University of Adelaide. The result of the observations thus tends to confirm those of Bothe and Kohlhörster in the North Atlantic, of Corlin at Abisco, and of Millikan at Churchill in Canada, in showing that the intensity of penetrating radiation does not vary to any considerable extent with magnetic latitude even within 250 miles of a magnetic pole.—W. Ayvazoglou.

(430) SUR LA DÉFINITION DE LA PÉRIODE DU POLONIUM EN DIVERS POINTS DE L'U. R. S. S.

(ON THE DEFINITION OF THE PERIOD OF POLONIUM AT DIFFERENT PLACES IN THE U. S. S. R.)

By M. L. Bogoiavlensky

Le Journal de Physique et le Radium, Paris, vol. 10, No. 9, 1929, pp. 321-328.

Owing to the fact that the considerable differences in the definition of the radioactive constant of polonium and of its period can not be explained merely by the inaccuracy of measurements, the experiments carried out by Bogoiavlensky and described in this article were made after a very careful preparation of polonium. After a brief description of the means used for preparing polonium, of the electromagnetic installation and of the technique of determining the period of polonium during the experiments, Bogoiavlensky gives the results of his measurements carried out in 18 different places in the U.S.S.R. in a table.

According to his calculations, the mean error of observations reached 8.3 per cent. In analyzing the errors caused by measurements the author draws the conclusion that the considerable changes in various places evidently depend on ocal causes, and supposes that the content of radioactive substances in rocks reatly influences the value of the period. This value increases with the ncrease of the quantity of radioactive substances and is smaller in case of he decrease of this quantity.

A map showing the places in which observations were made is added.

Bogoiavlensky's article is followed by "remarks," written by Mme. P. Curie n which she says that, based on some considerations, it is necessary to make more exact verification of the results published in this article.

In an additional note Bogoiavlensky admits that the remarks made by Mme. urie have already been taken into consideration for a new series of experiments. -W. Ayvazoglou.

(431) ÉTUDE DE LA VITESSE DE DÉSINTÉGRATION DU POLONIUM EN DIVERS LIEUX

(STUDY OF THE VELOCITY OF DISINTEGRATION OF POLONIUM IN DIFFERENT PLACES)

By M. L. Bogoiavlensky

e Journal de Physique et le Radium, Paris, vol. 2, No. 1, 1929, pp. 12-19.

In this article Bogoiavlensky gives the results of experiments carried out n continuation of those described in the article above. Three series of exeriments for the determination of the constant of polonium were made: One in he southern part of the U.S.S.R. (42 points), one in the region of Leningrad 18 points), and one in the vicinity of Leningrad, in Dietskoe Selo (3 points). he results are given in three tables. They show that the variations are coniderably smaller than those obtained during the experiments made in the preious year. This proves the existence of errors in previous investigations. mong them the author mentions the error caused by the standardized size of iece of polonium used.

Maps showing the investigated points, provided with figures of the results, re added.—W. Ayvazoglou.

6. GEOTHERMAL METHODS

(432) PROCÉDÉ DE PROSPECTION GEOTHERMIQUE

(GEOTHERMAL METHOD OF PROSPECTION)

By C. L. Alexanian

xtract from, Traité pratique de prospection geophysique (Practical treatise on eophysical prospecting), by C. L. Alexanian. Librairie Polytechnique Ch. éranger, 15, Rue des Saints-Pères, Paris, 6.

Values of geothermal gradients are given by the author for the following ountries:

	Meters Meters
Pribram (Czechoslovakia)	67
Sabountchy (Oil region near Baku, U.S.S.R.).	25
Machólles (Limagne).	14
Pechelbronn (Alsace).	14 to 21
Los Angeles (California)	14
Kutzenhausen (Alsace).	7

According to Koenigsberger the normal geothermal gradient in case of horizontal layers is about 34 meters. This value varies greatly in case of inclined or vertical layers.

The possible reasons for the great local anomalies of the geothermal gradient are given by Alexanian as caused by:

1. Deposits originated by heat processes or of volcanic origin.
2. The distribution of heat due to the displacement of various substances in the earth's crust, such as hot springs, mineral waters, and gas.
3. Deposits produced by heat caused by chemical reactions or deposits containing radioactive substances.
4. Thermal conductivity of rocks and tectonic displacements (heat produced by friction).

A list of thermal conductivity of rocks is given.

The last two paragraphs of the article contain a brief description of methods for measuring the temperature of the soil and a method for calculating the temperature gradient.—W. Ayvazoglou.

(433) GEOTHERMAL VARIATIONS IN COALINGA AREA, FRESNO COUNTY, CALIFORNIA

By Anders J. Carlson

Bulletin of the American Association of Petroleum Geologists, Houston, Tex., vol
15, No. 7, 1931, pp. 829-836.

Variations of isothermal elevations with respect to structure are developed from temperature measurements in 56 wells of the Coalinga area. The comparative trend of isotherms, geologic strata, and ground surface is shown on two vertical sections through the anticlinal structure of the Eastside field. The results indicate that rock temperatures in this vicinity are controlled chiefly by surface topography and thickness of sediments. Definite correlation between relative temperatures and the oil-bearing structure is not evident.—Author's abstract.

7. UNCLASSIFIED METHODS

(434) PRINCIPLES AND PRACTICE OF GEOPHYSICAL PROSPECTING

By A. B. Broughton Edge and T. H. Laby

Report of the Imperial Geophysical Experimental Survey, London, 1931.

The book contains XIV , 380 pages with 261 illustrations in the text. It s published by the Cambridge University Press (London, Fetter Lane, E. C. 4). rice, 15 s. net.

The form in which this work of the Survey has been prepared for publication s more in the nature of a manual or textbook of geophysical prospecting, illus- rated by field results, than of a formal report.

The volume is divided into two parts.

Contents:

Part I. Chapter 1. Introduction: Objects of the I. G. E. S. investiga- ions; selection of survey areas in Australia; organization of survey and field ork.

Chapter 2. Electrical methods: Principles and applications; surface poten- ial methods (spontaneous polarization, resistivity and resistivity surveys, quipotential line, A. C. potential ratio); electromagnetic methods (Bieler- atson, high-frequency).

Chapter 3. Electrical survey in Australia: New South Wales; Victoria; asmania; South Australia; Western Australia; Queensland.

Chapter 4. Gravimetric methods: Principles and applications; instruments; ield procedure; gravimetric survey in Australia; conclusions.

Chapter 5. Magnetic methods: Principles and applications; instruments; ield procedure; magnetic survey in Australia.

Chapter 6. Seismic methods: Principles and applications; seismometers; ield procedure; seismic investigations in Australia.

Part II. Chapters 7 to 11.

The electrical, gravimetric, magnetic, and seismic methods described in art I are dealt with in greater detail. Full descriptions are given of all nstruments used by the Survey and of the procedure followed in carrying out ield investigations. The methods are also considered from the theoretical point f view.—W. Ayvazoglou.

(435) ANCORA SULLE CARATTERISTICHE FISICHE DELLA PIANURA MARGINALE APPENNINICA MODENESE

(MORE ON PHYSICAL CHARACTERISTICS OF THE APPENNINIAN BORDER PLAIN OF MODENA)

By A. Belluigi

Rendiconti della R. Accademia Nazionale dei Lincei, Rome, vol. 12, No. 3-4, 1930, pp. 112-114.

In a previous article on the physical characteristics of the Appenninian border plain of Modena (see Geophys. Abs. 23, p. 80), Belluigi drew from the data obtained the conclusion that gypsum or similar minerals must be deposited at a certain depth in this region.

In this article Belluigi discusses briefly some considerations supporting the conclusions made in the first article.--W. Ayvazoglou.

(436) DISCRIMINATION IN APPLYING GEOPHYSICS

By Sherwin F. Kelly

Mining and Metallurgy, New York, vol. 12, No. 293, 1931, pp. 239-241.

Dissatisfaction with the achievements of geophysics, due often to a misconception of its capabilities and limitations, or to a poor application of its technique, or to a faulty perspective as to its proper place in geological work, caused the writing of this article as the author finds it imperative to help in understanding past achievements and failures, and through that to formulate workable programs for future progress by critical examination and correction of past records. Kelly expresses the hope that those in possession of information will engage in cooperation in providing the material which would be valuable in such a compilation. The article does not give any original contribution to geophysical science or art. The author discusses the question raised by him under the following headings: (1) Basic assumption, (2) lessons of hindsight, (3) valuable information, and (4) comparative study.--W. Ayvazoglou.

(437) GEOPHYSICS IN EXPLORATION: PROSPECT AND RETROSPECT

By Sherwin F. Kelly

Engineering and Mining Journal, New York, vol. 131, No. 1, 1931, pp. 11-12.

The purpose of this article is to clarify the question with respect to just what is the role geophysics should play in present-day exploration work.

The three distinct stages of the attitude toward, for example, electrical exploration (skepticism, over-optimism, indifference), are discussed.

A considerable list of literature dealing with this question is added.--W. Ayvazoglou.

(438) GEOPHYSICS IN THE MINING SCHOOLS

By V. Gavrilovich Gabriel

gineering and Mining Journal, New York, vol. 131, No. 7, 1931, p. 333.

In this short article the author expresses his opinion on studying geo-
ysics in universities and schools and recommends some ways by which, he hopes,
e unnecessary expenditures of money by schools could be avoided and the
thusiastic students of geophysics may be saved from disappointment.--W.Ayvazoglo

(439) THE SCIENCE OF GEOPHYSICS

By B. Dunstan

eensland Government Mining Journal, Queensland, vol. 32, Nos. 370, 371, 372,
pp. 95-96, 146-148, 186-187.

After a brief discussion on the practice of geophysical prospecting, Dunstan
ves a table of geophysical methods, somewhat similar to that published some
ars ago by Dr. Heiland of the Colorado School of Mines, which is built from
e point of view of the geologist, primarily based on geological and mineral
atures, and showing, approximately, the geophysical methods to be adopted in
e examination of certain mineral deposits, irregular rock masses, bedded
ructures, and dynamical features.

Some information is added on the restrictions to be applied when using the
thods, and the determinations which it is difficult or impossible to accomplish.
attempt is made to describe in detail the geophysical methods used for the
rpose of mineral prospecting, but simply an outline of these methods is given.

The methods are divided into six main groups, comprising electrical, gravi-
tric, magnetic, seismic, radioactive, and geothermal methods.--W. Ayvazoglou.

(440) PROGRESS OF GEOPHYSICAL PROSPECTING STUDIES

Editorial Note

eensland Government Mining Journal, Brisbane, vol. 32, No. 370, 1931, p. 121.

In the course of studies of the use of geophysical methods in prospecting
r minerals, work is being conducted by the United States Bureau of Mines,
epartment of Commerce, in the oil districts of Kentucky with a view to checking
rther the results of electrical investigations. The bureau is making progress
the devising of seismic calibrating apparatus, as well as on the improvement
torsion-balance instruments by developing a new method of accurately recording
all angles.--W. Ayvazoglou.

(441) ÉTUDES GÉOPHYSIQUES APPLIQUÉES AUX RECHERCHES MINIÈRES

(GEOPHYSICAL STUDIES APPLIED TO MINING INVESTIGATIONS)

By Arnaldo Zabelli

L'Écho des Mines et de la Métallurgie, Paris, vol. 59, No. 3058, 1931, pp. 196-200.

In the beginning of this article Zabelli mentions the initiative taken by the United States Bureau of Mines in collecting and publishing the results of mining exploration by geophysical methods of prospecting and puts the questi as to how the results obtained from this investigation can best be applied to the mineral industry in general, and how, for example, the following problems could be solved:

1. To establish in a scientific way to what degree there are appreciable links between the indications obtained by instruments and physical properties (electrical, magnetic, radioactive, thermic, electromagnetic, etc.) of minerals hidden in the soil.

2. To specify the importance of various geophysical methods of prospecting concerning the place of each of them which they must occupy in the industry of mining exploration.

3. To determine the best direction to be given to further investigations.

4. To find the best means for eliminating those unfit prospectors and inventors who, owing to their failures, only delay the development in the application of geophysics to prospecting for ores.

Based on a few examples given in this article the author concludes that under the actual knowledge of geophysical proceedings it is not possible to establish with certainty either the methods which may be applied in certain cases nor to classify them according to their degree of superiority.--
W. Ayvazoglou.

(442) DIE POLARISATION DES HIMMELSLICHTES UND IHRE ZUSAMMENHÄNGE MIT ANDEREN METEOROLOGISCHEN ELEMENTEN

(SKY POLARIZATION AND ITS RELATIONS TO THE OTHER METEOROLOGICAL ELEMENTS)

By W. Smosarski

Gerlands Beitrage zur Geophysik, Leipzig, vol. 30, No. 3/4, 1931, pp. 408-424.

The annual variation of the sky polarization at noon and at sunset is discussed, taking into consideration the three components of the diffuse light-intensity. Then the relations are examined which have been observed between the simultaneous changes of the sky polarization, the intensity of solar radiation, the water-vapor tension, the electrical potential, the electrical conductivity of the air and other meteorological elements.

The relations seem to depend on the seasons of the year and also on the egree of polarization.--Author's abstract.

(443) LIMITATIONS OF GEOPHYSICAL METHODS IN OIL PROSPECTING

Editorial Note

ueensland Government Mining Journal, Brisbane, vol. 32, No. 373, 1931, p. 230.

Conditions of geophysical prospecting for oil are discussed, based on owe's article, "Geological Prospecting for Oil Still in Research Stage," ublished in National Petroleum News, vol. 21, No. 47, 1929, pp. 59-63 (see eophys. Abs. 10, 1930, p. 24).--W. Ayvazoglou.

(444) GEOPHYSICAL PROSPECTING

Editorial Note

New York Times, N. Y., Monday, August 3, 1931, p. 32.

The note says that according to a Canadian Pacific Railway bulletin, urther tests will be made on geophysical prospecting during this year by the ollowing three Government field parties:

1. A. S. Eve and D. A. Keys of the McGill University will, in collabora- ion with the U. S. Bureau of Mines, conclude investigations started last year nto the behavior of high-frequency radio waves underground (Mammoth Cave).

2. L. Gilchrist of the University of Toronto will continue research in he field with a variety of electrical and magnetic methods for the purpose of scertaining their serviceableness in the search for concealed mineral deposits chromite of Thetford, Quebec, magnetite of Bristol, Quebec, and pyrite of alabogie, Ontario).

3. The Dominion Observatory and the Geological Survey are collaborating n research in gravitational methods of studying underground conditions. A. H. iller of the Dominion Observatory started work late last year with torsion alance to ascertain its use in determining faults.

Results already accomplished in the survey of Canadian mineral resources re briefly mentioned.--W. Ayvazoglou.

(445) GEOPHYSICAL TESTS IN THE RHINE VALLEY

By R. P. Reichenbach and H. Bertram Bateman

The Mining Magazine, London, vol. 44, No. 5, 1931, pp. 280-285.

The authors describe the investigation of structural conditions in the hine Valley carried out by gravimetric, seismic, and radioactive methods of eophysical prospecting. Calculated values for gradients and values of curva- ture, as well as values resulting from the measurements, are shown in a figure.

From this figure it can be seen that the calculated values of the gradients for the geological profile underneath coincide with the measured values to within ± 1 unit. In case of the values of curvature the difference between the calculated and the measured curve amounts to about 25 units; the measured curve lies higher than the calculated one.

The results of the gravimetric survey in this area show that the bedrock rises from south to north and also from east to west. Only an approximate estimate of the depth could be given by gravimetric survey.

Seismic measurements carried out in the Lower Rhine basin southwest of Cologne serve as a further example of the elucidation of structural conditions.

The results of seismic survey are shown in accompanying diagrams and it can be seen that the seismic measurements were able to determine a remarkable number of faults of varying throw which dip northeastwards. At the same time the seismic measurements were able to determine the thickness of the Tertiary deposits.

Lastly, the radioactivity test measurements made at Hennef-on Sieg are briefly referred to. The results of these measurements can be seen from the curve of the measurement values shown in a figure.

The authors conclude that the results of these different geophysical surveys demonstrate that the practical geophysical methods now available, if expertly applied, can give very valuable data, not only on the geological conditions of an area from the mining point of view, but also from the purely geological standpoint.--W. Ayvazoglou.

(446) COMPTES RENDUS DE L'ASSEMBLÉE DE STOCKHOLM

(SECTION DE MAGNÉTISME ET ÉLECTRICITÉ TERRESTRES)

(PROCEEDINGS OF THE MEETING IN STOCKHOLM. SECTION OF TERRESTRIAL MAGNETISM AND ELECTRICITY. 15-23 AUGUST, 1930)

Bulletin 8, Union Géodesique et Géophysique International. Published by Ch. Maurain, 1931, 479 pp. Paris V, Les Presses Universitaires de France.

This volume includes the proceedings of the Section of Terrestrial Magnetism and Electricity of the International Geodetic and Geophysical Union held in Stockholm, Sweden, from August 15 to 23, 1930.

Detailed reports on the progress of magnetic-survey work and investigations were received from the following countries. They are given in Part II of this volume.

Australia. General report by J. M. Baldwin.

Canada. Report on observatory work at Agincourt and Meanock, by W. E. Jackson. Magnetic survey work in Canada by the Dominion Observatory, Ottawa, by C. A. French. Magnetic work accomplished by the Topographic Survey of Canada in 1927-1929, by F. H. Peters. Section of Terrestrial Magnetism and Electricity, National Committee of Canada.

Denmark. Report on the works on terrestrial magnetism in Denmark and reenland, by D. la Cour.

Finland. Progress of work in terrestrial magnetism in 1928-1930, by Keränen.

France. Report by the secretary of the French section of magnetism and rrestrial electricity, by E. Mathias. Regular observations and publications oncerning terrestrial magnetism, by Ch. Maurain.

Germany. Report on the earth-magnetic work in Germany, by A. Nippoldt.

Great Britain. Atmospheric electricity at Kew Observatory. Work in rrestrial magnetism at Scottish observatories. Report of the work done in errestrial magnetism and atmospheric electricity at Greenwich and Abinger, by . W. Dyson. Note on the work in terrestrial magnetism done at Stonyhurst ollege Observatory, by E. D. O'Connor. Ordnance Survey, Magnetic work. Work n terrestrial magnetism and atmospheric electricity, by S. Chapman and ollaborators. Work in terrestrial magnetism carried out by A. Crichton itchell.

Italy. Note on the work executed in Italy on magnetic field and terres-rial magnetism in 1928-1929.

Japan. National report of Japan, by A. Tanakadate.

Mexico. Report of the magnetic station of the Astronomic Observatory f Tacubaya, by Joaquim Gallo.

Netherlands and Netherlands East Indies. Terrestrial magnetism in the etherlands and Netherlands East Indies.

Norway. Report of the magnetic works in Norway, 1927-1929, by O. rogness. Report from the Norwegian Institute for Cosmic Physics, in charge f (a) The Northlight Observatory, Tromsö; (b) The Magnetic Bureau, Bergen, by . Vegard. Report regarding the first year's work at the Northlight Observatory, romsö, by Leiv Harang.

Poland. Magnetic survey in Poland, by St. Kalinowski. Report on the agnetic investigations of the geophysical institute of Lwow University during he years 1928-29, by Edward Stenz and Henryk Orkisz.

Portugal. Report on the terrestrial magnetism in Portugal, by A. Ferraz e Carvalho. Works on the terrestrial magnetism in the Azores, by J. Agostinho.

Siam. Magnetic observations, by the Director, Royal Survey Department.

Spain. A brief report by M. Luis Rodes.

Sweden. Magnetic work accomplished by the Hydrographic Office of Sweden from 1927-1930, by Gustaf Reinius. Summary report of the earth-magnetic investigations carried out in the mainland of Sweden, by Kurt Mollin.

Switzerland. Works on terrestrial magnetism in Switzerland from 1927 to 1930, by P. L. Mercanton. Magnetic survey of Switzerland by W. Brückmann.

United States. Report of work of section of terrestrial magnetism and electricity of the American Geophysical Union, 1928-1930, by J. A. Fleming and Harlan W. Fisk. Progress-report of Naval Research Laboratory, by E. D. Almy. Condensed summary work of the geophysical section, U. S. Bureau of Mines, by Scott Turner. Report on work of Radio Laboratory, Newton Centre, Massachusetts by Greenleaf W. Pickard. Progress-report of Mount Wilson Observatory, by W. S. Adams. Report by the Department of Terrestrial Magnetism, Carnegie Institution of Washington.-

Part III contains reports concerning special matter as resulting from decisions taken at the meeting in Prague, such as:

Report of Commission on magnetic characterization, by A. Crichton-Mitchell.

Magnetic characterization, suggestion from Stonyhurst College Observatory, by J. P. Rowland.

The Atlas of Auroras.

Relations between the International Meteorologic Organization and the International Geodetic and Geophysical Union.

Terminology and symbols. Report by Ch. Maurin. Observations by Cabrera van Dijk and Fleming.-

Part IV. Communication on various subjects:

A. General note of the Department of Terrestrial Magnetism, Carnegie Institution of Washington (comments on the agenda for the Stockholm meeting) contains the following articles: Magnetic characterization of days, studies of sudden commencement of magnetic storms; portable apparatus for accurately recording the magnetic elements continuously during short periods at field-stations; observations of polar lights; the atlas of auroras; observations of earth currents; correlation between radio reception and the phenomena of terrestrial magnetism and electricity, auroras, and solar activity; relations between atmospheric pollution and atmospheric nuclei of all kinds and the atmospheric-electric elements; study of ion-counters; phenomena of lightning; terminology; methods of applying the principles of geophysics to the investigation of the earth's crust; relationship with the magnetic commission of the International Meteorological Committee; observatory work; field work (magnetic surveys, provision for insuring the reoccupation at regular intervals of a sufficient number of stations all over the globe to supply necessary data regarding the secular change of the earth's magnetism); polar year 1932-1933;

cular variation of terrestrial magnetism; atmospheric conductivity; atmos-
eric ionization; measurement of air-earth current; observations of terres-
ial magnetism and atmospheric electricity on the last cruise of the
arnegie," by J. A. Fleming; the library of the Department of Terrestrial
gnetism of the Carnegie Institution of Washington, by H. D. Harradon.

B. Terrestrial magnetism:

Latest annual values of the magnetic elements at observatories, compiled
J. A. Fleming; investigation of the distribution of some individual changes
magnetic elements during a magnetic storm, by W. J. Peters; The geographical
stribution of magnetic disturbance, by W. F. Wallis; ordinate-change inte-
ator by C. Huff; preliminary note on a measure of magnetic activity using an
dinate integrator, by C. R. Duvall; isopors and isoporic movements, by H. W. F
isk; on the distribution of permanent repeat stations, by H. W. Fisk and J. A.
eming; on the earth magnetic observations on the ice, by J. Keränen; a port-
le magnetometer of the small type (Ordnance Survey); magnetism of rocks;
servations of sudden variation of terrestrial magnetism in 1928 and 1929, by
Ono; Disturbance in the magnetic observations caused by electric works, by
Ono; Analysis of periodical variations; components of the diurnal amplitude
declination, by H. Labrouste; Memorandum on an international collaboration
r the advancement of studies of the influence of the moon on geophysical
enomena, by D. la Cour and S. Chapman; on the theory of the diurnal solar
d lunar variations of the terrestrial magnetic field, and of the magnetic
rturbation, by S. Chapman; the measurement of potential gradient in the
per atmosphere, by F. J. W. Whipple; on the properties of the upper atmos-
here, by B. Rolf; on the temperature of the upper atmosphere, by G. M. B.
bson.

C. Atmospheric electricity:

The diurnal variation of the electric potential of the atmosphere over
e oceans, by W. C. Parkinson and O. W. Torreson; the importance of atmospheric-
lectric observations at sea, by O. H. Gish; note on the establishment of ob-
ervatories for the measurement of atmospheric electricity, by G. R. Wait;
me general information which should be included in reports of atmospheric-
lectric observations, by O. H. Gish; Aitken condensation-nuclei and atmos-
heric potential-gradient at Washington, by G. R. Wait; note on investigation
f electrical conditions in the upper atmosphere, by M. A. Tuve; the use of
esistivity measurements in the detection of mineralized areas, by W. J. Rooney;
he measurement of potential gradient in the upper atmosphere, by F. J. W.
hipple; studies on the electric field of the atmosphere, by Ch. Maurain; the
eriodic variations of atmospheric potential gradient, by L. Rodes; on some
easurements of atmospheric electricity on the Mont Blanc and in Sahara, by
ean Lugeon; electrical conductivity of the air and of the atmospheric dusts
n the Vesuvius, by Francesco Signore; on the particles in suspension in the
tmosphere, by Denise Daude; on the atmospheric ionization, by Ch. Maurain
nd E. Salles; the measurement of air-earth current, suggestion from F. J. W.
hipple; phenomenon of the lightning, by M. Mathias; fulminating matter, by
. Mathias.

D. Aurora borealis:

Memorandum on several recent investigations concerning aurora borealis and phenomena connected with it, by Carl Störmer; letters and notes answering Störmer's inquiry on aurora borealis; proposition for researches relative to the synoptical distribution of the aurora borealis, by D. la Cour; on the desirability of a very exact determination of the wave length of the line 5777 Å from the aurora display, by Helge-Petersen; on the measurement of the length of the wave of the main rays of the aurora borealis, by L. Vegard.

Part V. Contains questions discussed by the section of terrestrial magnetism and electricity together with other sections, and the last.

Part VI. Gives some resolutions and wishes expressed by the section.

A list of addresses of the members who took part in the meeting is added.

A brief review of the proceedings of the section of electricity and magnetism is given by J. A. Fleming in the Journal of the Washington Academy of Sciences, vol. 21, No. 5, March 4, 1931, pp. 90-92. It reads as follows:

> Six scheduled and well-attended meetings of the Association of Terrestrial Magnetism and Electricity at Stockholm were held during August, 1930, and the Association also took part in four joint sessions - one with the Associations of Geodesy and Seismology, one with the Association of Meteorology, and two with the International Scientific Radio Union. The agenda for the meeting held an unusually great number of items, all of which were actively reported upon and discussed despite the comparatively short time available.
>
> Detailed progress reports of magnetic-survey work and investigations were received from twenty countries, including three reports from the United States -- the Coast and Geodetic Survey, the American Geophysical Union, and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Numerous publications relating to these reports were distributed, and one was impressed not only with the amount of useful work in the fields of the Association being done throughout the world but also with the vast amount still to be done.
>
> The report of the special committee on the preparation of a photographic atlas of aurora with type descriptions and instructions for photographic and visual observation was received and approved, and authority was given that copies of the atlas be distributed without charge to observatories and organizations where worth-while auroral observations might be made. Following the report of the special committee on criteria of measures of magnetic activity, the formulas for characterization of days $(HR_H + ZR_Z)$ / 10,000 or $(NR_N + WR_W + ZR_z)/10,000$ were adopted, where R represents the absolute daily range of the element indicated for the

Greenwich day, and arrangements were proposed that data derived by one or the other formula be published by the International Commission of Terrestrial Magnetism and Electricity in its regular publication of magnetic character of days.

The importance of continuing comparisons of standard electromagnetic instruments of various governments was emphasized, as also the design of portable apparatus of this character. It was agreed that the various suggestions on the subject of a uniform terminology be published for further consideration. The adoption of Greenwich mean time for the publication of magnetic data was referred for further consideration to a special committee. A reporter was appointed to summarize the progress in the studies of theories of terrestrial magnetism.

The importance of standardizing ion counters was emphasized, and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington was appointed as a central office to which matters could be referred pertaining to ion counters for compilation, discussion, and determination of the standards. Following discussion of the electric field of the atmosphere, it was agreed that tabulations to determine electric character of the day might best be limited to electrically calm days.

Among the communications of particular interest in atmospheric electricity was one on the direct recording of air-earth current at the Kew Observatory by the C.T.R. Wilson method; such records may be compared with indirect determination through the records also being made of the conductivity and potential gradient of the atmosphere.

Considerable attention was given economic aspects of the Association's activities. These included the application of geophysical principles to the investigation of the earth's crust; it was agreed that a committee be appointed jointly by the associations of Seismology, Geodesy, and Terrestrial Magnetism and Electricity to collaborate in the solution of problems in geology through geophysics. Another economic aspect was the development of machine methods to facilitate the complex computations and compilations required in studying the numerous data accumulated by many observatories. An example of this was brought out in the report of a special committee on international collaboration for the advancement of studies of the influences of the moon on geophysical phenomena developing a plan for the assembling of data making use of Hollerith methods for compilations. The report was favorably considered and satisfaction expressed that a practical trial of the application of such a method was in prospect, thus paving the way for a definite proposal for international cooperation later.

Much attention was also given the proposal for the Jubilee Polar Year of 1932-33 of the Polar Commission of the International Meteorological Committee, and the desirability of adherence in the undertaking of all governments was stressed. Following a joint meeting of the Associations of Meteorology and of Terrestrial Magnetism and Electricity and the deliberations of a special joint committee, the following resolution was prepared for and later adopted by the General Assembly:

"The Union accepts the invitation of the International Meteorological Committee to cooperate in organizing and carrying out a second Polar Year with a similar object to that of the first Polar Year 1882-1883, and appoints the following Commission for this purpose: Störmer (Chairman), Chapman, La Cour, Maurain, and Wehrle."

Other resolutions proposed by the joint committee were adopted by the Association. One emphasizes the very great importance for the advancement of geophysical science for the Polar Year as planned and its approval that the observations should not be confined only to polar regions. The Association, realizing the desirability that all cameras, plates, and spectroscopes used in the observations of the aurora should be of equal sensitivity, voted 15,000 gold francs for the provision of instruments of a standard type. It was further unanimously resolved that all observations should be reduced according to an agreed plan and that the Commission for the Polar Year should consider the best method for making the detailed results available for all those interested, further suggesting that all published volumes should be put on sale and that the various associations of the Union should subscribe for a number of copies.

Regarding possible overlapping of the work being done by the Association of Terrestrial Magnetism and Electricity and the Commission on Terrestrial Magnetism and Electricity of the International Meteorological Committee, it was unanimously agreed upon that it is not necessary to set a rigorous definition of the domain of each organization, as no difficulties have been met with in practice and no unnecessary duplications have been encountered, and as the respective officers can continue their effective cooperation in avoiding these.

The importance of study of the correlation of the reception of wireless signals and geophysical phenomena was referred to two joint meetings with the International Scientific Radio Union, the Association expressing itself as approving any program assuring the broadcasting of cosmic phenomena to facilitate the study of correlations concerning radio communication and the magnetic and electric condition of the Earth.

Recognizing the vital need of a better world-wide distribution of observatories, especially in the southern hemisphere, a special committee was appointed to consider existing and desirable distribution of magnetic and electric observatories and to consider plans for better coordination of work and publications of existing observatories. The economic impossibility of realizing more than a limited number of observatories and the reports on secular-variation investigations submitted stressed the need of systematic field work, and a special committee was appointed to plan and to accomplish means to secure through cooperation of interested governmental and private organizations well-distributed secular-variation data. In connection with this subject, appreciation of and generous comment was expressed on all sides on the magnetic and electric work at sea secured by the "Carnegie" together with expressions of regret that the work that vessel and her commander and staff had so well done could not have been continued as planned. -

8. GEOLOGY

(447) MICROSCOPIC SUBSURFACE WORK IN OIL FIELDS OF THE UNITED STATES

By R. D. Reed

ulletin of the American Association of Petroleum Geologists, Houston, Tex.,
vol. 15, No. 7, 1931, pp. 731-754.

On the basis of information furnished by subsurface workers in different istricts, an attempt is made in this paper to describe the present status of he applications of the microscope to the solution of subsurface problems in he oil fields of the United States. Corresponding with the geology of the ifferent areas, the development of microscopic work has assumed widely different forms, but the degree of success attained seems to be uniformly high. ontributions to regional geology made by the new methods are already great, nd the promise for the future is bright.--Author's abstract.

9. NEW BOOKS

448) Angenheister, G. Geophysik. II Teil. Physik des festen Erdkörpers und des Meeres (Geophysics, Part II, Physics of the solid part of the earth and of the ocean). Unter der Redaktion von G. Angenheister bearbeitet von A. Defant, F. Hopfner, K. Jung, G. Kirsch, F. Kossmat, G. Krumbach, O. Meisser, H. Schmehl, G. Tammann, E. Tams. Wien-Harms, Handbuch der Experimentalphysik, Band 25, II Teil, Leipzig, Akademische Verlagsgesellschaft m.b.H., 1931, xiii + 823 pp., 313 figs., 3 tables. Price, 74 marks, bound 76 marks. The present volume is the second of three parts which constitute volume 25 (Geophysics) of Wien-Harms monumental Handbuch der Experimentalphysik. A brief review of the book is given by H. D. Harradon in Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 2, 1931, p. 147.

10. PATENTS

(449) METHOD OF EXPLORING THE SUBSOIL

Richard Ambronn, of Göttingen, Germany.

United States patent 1,805,900 Patented May 19, 1931.

This patent discloses a method of exploration of the subsoil comprising feeding it with alternating current under control of the form of oscillation ellipses of the field produced thereby and measuring the field of the ground currents. For this purpose at least two current systems of like frequency and with phase displaced with respect to each other are excited in the ground. By suitable correlation of such current systems within the field of investigation it is possible to make the polarized electrical current field produced thereby approximately circular.

Claims allowed - 5.

(450) METHOD OF AND APPARATUS FOR LOCATING DEPOSITS OF OIL, GAS AND OTHER DIELECTRIC SUBTERRANEAN BODIES

Louis C. Billote, of Revere, and Edward Lipson, of Chelsea, Mass., assignors to Oil Finding Corporation, a corporation of Delaware.

United States patent 1,808,397 Patented June 2, 1931.

This invention relates to an improved method and apparatus for uses in the location of deposits of oil and gas; it may also be used in locating other subterranean deposits having relatively high dielectric characteristics compared with the surrounding medium.

The invention is based on the fact that when a current of relatively high frequency is permitted to enter the earth through spaced electrodes, the observed effect is different when a deposit of a high dielectric nature, such as oil or gas, lies beneath the electrodes than when such deposit is not present.

Claims allowed - 14.

(451) METHOD AND APPARATUS FOR LOCATING UNKNOWN CONDUCTIVE BODIES

John J. Jakosky, of Los Angeles, Calif., assignor to the Radiore Co., of Los Angeles, Calif., a corporation of California.

United States patent 1,811,547 Patented June 23, 1931.

This invention relates to the location of orebodies, pipe lines or other bodies of relatively good electrical conductivity, within the earth's crust or any mass of relatively poor conductivity, and particularly to the location of ch bodies by methods known as "inductive methods." The method comprises ergizing the conductive body by means of an electromagnetic field transtted from an energizing loop, and then, by means of a direction-finding il, detecting the presence and measuring the effect of the secondary elecomagnetic field resulting from the induced current in the conductive body a plurality of points adjacent to the energizing loop, the directionnding coil being rotated, for the purpose of making such measurements, about axis substantially parallel to the direction from the coil to the ergizing loop.

Claims allowed - 8.

(452) METHOD OF DETERMINING THE STRAIGHTNESS OF DRILL HOLES IN THE EARTH

sme Eugene Rosaire, of Fort Worth, Texas, assignor to Geophysical Research Corporation, of New York, N. Y., a corporation of New Jersey.

ited States patent 1,811,648. Patented June 23, 1931.

The method of determining the deviation from the vertical of a bore ormed in the earth comprises producing sound waves at different points on e earth's surface and recording the time intervals required by the sound aves to travel from each of the points to a selected place in the bore below e surface of the earth and calculating the position of the points from reorded time intervals, the known distance of surface points from the mouth of e bore, and the known distance of the selected points from the mouth of the ore.

Claims allowed - 7.

(453) METHOD OF AND APPARATUS FOR LOCATING TERRESTRIAL CONDUCTING BODIES

heodor Zuschlag, of New York, N. Y., assignor to Swedish American Prospecting Corporation, of New York, N. Y., a corporation of New York.

nited States patent 1,812,392. Patented June 30, 1931.

This invention relates to an electromagnetic device for determining the ffects produced by conducting bodies, such as ore deposits, metals, water ourses, salt-water beds, moist ground and the like, when an electromagnetic ield is generated in their vicinity, and a method of locating and determining he proximity of the conducting bodies by the use of such a device. The pparatus comprises an exciter coil adapted to generate a primary electroagnetic field to induce a secondary field in any conducting body located in he vicinity, a plurality of receiving coils adapted to be inductively influenced by the secondary field, the receiving coils being disposed on opposite sides and in the center of the exciter coil, and providing compensating eans for eliminating any inductive influence of the primary field on the eceiving coils.

Claims allowed - 20.

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[3] The first figure refers to the number of the abstract, the second to the method of prospecting as indicated in the Table of Contents, and the third to the page.

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vember, 1931.

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No. 31

Compiled by Frederick W. Lee[2]

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1. GRAVITATIONAL METHODS

(454) FUNDAMENTAL FORMULAS FOR THE ANALYSIS OF TORSION-BALANCE OBSERVATIONS (IN RUSSIAN)

By B. Numerov

Transactions of the Geological and Prospecting
Service of U. S. S. R., Leningrad, No. 36, 1931,
pp. 27-41.

This paper concerns deduction of practical formulas for calculating the gradients of the gravity variometer in the cases of either 5 or 3 azimuths. Special attention is given to formulas for the calculation of gradients from combinations of three arbitrarily chosen positions of I and II levers. The last-mentioned formulas may be of special importance in so-callod "sticking" of the lever.--Author's abstract.

(455) NORMAL EFFECT OF THE EARTH'S ELLIPSOID UPON THE DERIVATIVES OF THE GRAVITY POTENTIAL (IN RUSSIAN)

By B. Numerov

Transactions of the Geological and Prospecting
Service of U. S. S. R., Leningrad, No. 36, 1931,
pp. 42-50.

The author deducts formulas for the first and second derivatives of the gravity potential in the case of the earth's ellipsoid. The table at the end of the article gives the normal value of gravity and the normal value of gradients observed with the variometer, as function of the latitude φ. --Author's abstract.

(456) ANALYTICAL METHOD OF CALCULATING THE INFLUENCE OF TOPOGRAPHIC MASSES (IN RUSSIAN)

By B. Numerov

Transactions of the Geological and Prospecting
Service of the U. S. S. R., Leningrad, No. 36, 1931,
pp. 75-86.

In a previous article (see Geophys. Abs. 1, p. 4) Numerov deduced formulas for calculating the influence of topographic masses upon the observations made by the torsion balance. In this article he gives another method of calculating this influence based on the supposition that the relief changes linearly between two level marks. The formulas are deduced on the basis of the quadratic members for inclination and are valid for slopes of not over 0.1.--W. Ayvazoglou

(457) GRAPHICAL METHOD OF CALCULATING THE INFLUENCE OF TOPOGRAPHIC MASSES UPON THE OBSERVATIONS MADE BY A TORSION BALANCE (IN RUSSIAN)

By N. Samsonov

Transactions of the Geological and Prospecting Service of the
U. S. S. R., Leningrad, No. 36, 1931, pp. 86-96.

A method is given for exact calculation of the integrals A and B from the ariables l and h, in a vertical plane passing through the center of the instru- ent. The method is reduced to computation of the areas of equal action be- een a horizontal straight line passing through the center of the instrument, nd the curve of the relief h = f (e), which may be constructed with a chosen rade of exactitude. The integration with respect to the angle α is usually erformed by expansion of the functions A and B into Fourier's series.-- uthor's abstract.

(458) INFLUENCE OF EXTRANECUS MASSES UPON GRAVITY OBSERVATIONS INFINITELY EXTENDED (IN RUSSIAN)

By B. Numerov

Transactions of the Geological and Prospecting Service of the
U. S. S. R., Leningrad, No. 36, 1931, pp. 97-107.

By using the gravitational method of geological survey the deposit may e found to occur in the following forms:

1. The deposit may be of a spherical form surrounded by a homogenous mass of great extension and magnitude;

2. Of the form of an infinite horizontal prism of any cross section; the latter may be of a closed contour, open contour, or of a semi-open contour in the form of a layer with an obliquely cut edge of various inclination; and finally

3. Of an arbitrary relief of the surface separating two deposits having different densities.

In this article Numerov discusses two cases of deposit having infinite xtension: that of a cross section in the form of a closed contour and that f a layer with an obliquely cut edge.

A graphical solution of the first case is given; for the second case ables are calculated from which an atlas may be drawn illustrating the in-fluence of bedded deposits for various angles of the obliquely cut edge.— V. Ayvazoglou.

(459) RESULTS OF GRAVITY OBSERVATIONS IN KRIVOY ROG IN 1928 (IN RUSSIAN)

By S. Alexandrov

Transactions of the Geological and Prospecting Service of U. S. S. R., Leningrad, No. 36, 1931, pp. 135-139.

Results of gravity observations carried out in 1928 near Krivoy Rog by means of pendulums are described. Twenty-two stations were selected along two profiles, traced perpendicular to the extension of the iron quartzites. Bambergs four-pendulum apparatus was used. The final results are shown in a table. The positions of the points of observation and the broken line showing the gravity anomaly along the northern profile are given in a figure. The first maximum corresponds to a fold in the quartzites; the second, of greater extent, points to a new rise of the lower rocks. Preliminary results of observations made in 1929 are shown in four points situated at the south eastern prolongation of the profile.--W. Ayvazoglou.

(460) THE SEARCH FOR PETROLEUM IN ITALY

Editorial Note

The Petroleum Times, London, vol. 25, No. 633, 1931, pp. 283-284.

A brief historical sketch of prospecting for oil by geophysical methods finally resulting in the discovery of a productive deposit at Fontevivo (Parma Province) by gravimetrical investigations carried out by Belluigi is described. A map of Italy indicating petroleum districts is given.--W. Ayvazoglou.

2. MAGNETIC METHODS

(461) RÈGLES PRATIQUES POUR DÉTERMINER LES CONSTANTES D'UN MAGNÉTIOMÈTRE

(PRACTICAL RULES FOR DETERMINING THE CONSTANTS OF A MAGNETOMETER)

By C. L. Alexanian

Annales de l'office national des combustibles liquides, Paris, vol. 6, No. 2, 1931, pp. 261-267.

Based on practical experience Alexanian gives some practical rules for determining the constants of magnetometers in order that those who use them may be able to do this without addressing themselves to the manufacturers.

Lloyd-Schmidt's magnetometer (vertical and horizontal) and Haalck's universal magnetometer are considered.

I. Lloyd-Schmidt's magnetometer:

1. Adjustment of the zero point of the scale;
2. Adjustment of the sensitivity of the magnetometer;
3. Determination of the constant of the scale;
4. Periodical determination of the magnetic moment of an auxiliary magnet.

. Haalck's universal magnetometer:

1. Adjustment of the zero point of the scale;
2. Adjustment of the sensitivity;
3. Determination of the constants.

The three constants to be determined are: K - the constant of the scale
r the vertical component; K_n - the constant of the scale for the horizontal
mponent, direction N; and K_s - the constant of the scale for the horizontal
mponent, direction S.

I. Determination of the temperature constants for Lloyd-Schmidt and Haalck
gnetometers.

—W. Ayvazoglou.

(462) THE LUNAR-DIURNAL MAGNETIC VARIATION IN RELATION TO THE GEOGRAPHIC AND MAGNETIC EQUATORS

By J. Egedal

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 36, No. 2, 1931, pp. 139-140.

In a previous article, "On the calculation of the potential of the diurnal
arth magnetic field of variation," published by J. Egedal in the "Zeitschrift
ir Geophysik," vol. 6, No. 4-7, 1930, pp. 263-265 (see Geophys. Abs. 18, p. 9),
he author stated that a representation of the field of the solar-diurnal mag-
etic variation ought to contain magnetic, as well as geographic coordinates,
ince the solar-diurnal variation depends on magnetic latitude of the place of
bservation. In this article Egedal shows that also the lunar-diurnal magnetic
ariation depends on the magnetic latitude of the place of observation; thus
ot only the geographic equator, but also the magnetic equator is of importance
ith respect to the distribution of the field of the lunar-diurnal variation
nd therefore in representing the field of the magnetic variations it is neces-
ary to use geomagnetic coordinates. Observation from Para, South America,
ere used; the departures from the mean of easterly declination for different
unar hours are given in a table.—W. Ayvazoglou.

(463) NEW SURVEYS MADE BY MAGNETOMETER

Editorial Note

California Oil World, Los Angeles, vol. 23, No. 40,
April 30, 1931, p. 15.

Some results of scientific research conducted in California by a group of experts using a new type of magnetometer are disclosed in this paper. Although the tests were of an experimental character, the instrument, perfected as the result of scientific effort on the part of professors of geology in an eastern university, is considered to be refined to such a degree that the results of its readings were more pronounced than any previous tests made in California fields, according to data they have compiled.

Three well-known areas in the Dominguez hills, in Los Angeles Basin, and the Weed-Patch-Arvin district southeast of Bakersfield, were selected for comparison. The results are given in maps and diagrams. The group intends to continue its research and experimental work in the oil-producing districts of California.--W. Ayvazoglou.

3. SEISMIC METHODS

(464) DAS NORDSEEBEBEN VOM 24 JANUAR 1927

(THE NORTH SEA QUAKES OF JANUARY 24, 1927)

By Niels Henr. Kolderup and Gerhard Krumbach

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 5/6, 1931
pp. 225-232.

The authors draw attention to the possibility of applying Wulff's net, used in crystallography, for the examination of microseismic material. After a general consideration of the earthquake phenomena in Norway, the authors discuss the question of the origin of earthquakes in Norway.--Authors abstract translated by W. Ayvazoglou.

(465) EXPERIMENTELLE PRÜFUNG VON VERSPÄTUNGSFRAGEN BEI DER GALVANOMETRISCHEN REGISTRIERMETHODE

(EXPERIMENTAL TEST OF QUESTIONS OF LAG IN USING THE GALVANOMETRIC METHOD OF REGISTRATION)

By J. Wilip

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 5/6, 1931, pp. 219-225.

Scientists who especially devoted themselves to the study of local earthquakes have sometimes expressed the opinion that the beginning of the first phase of an earthquake could be noticed by apparatus provided with mechanical optical registration earlier than by apparatus with galvanometric regis- ation. The author mentions two possible reasons which, however, do not pend on the sensitivity of the seismograph--namely the self-induction and e inertia of the galvanometer coil.

In order to solve this question the author undertook some experimental sts, the results of which are made known in this article.

A seismograph with galvanometric registration was arranged so that direct tical registration of a high sensitivity could be obtained at the same time. riodical oscillations were registered by both methods. The movements of ort periods were registered by the galvanometric method without any delay. gures showing the arrangement of the apparatus and seismograms obtained by gistration are added.--W. Ayvazoglou.

(466) SEISMISCHE UNTERSUCHUNGEN AUF DEM PASTERZEGLETSCHER. II

(Seismic Investigations on the Pasterze Glacier. II)

By B. Brockamp

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 5/6, 1931,
pp. 232-240.

The first article on the seismic investigations of the Pasterze glacier peared in the "Zeitschrift für Geophysik," vol. 6, No. 8, 1930, pp. 482-500 ee Geophys. Abs. 21, p. 7).

In this article Brockamp has continued his investigations for obtaining liable data necessary for examination of seismogram amplitudes and periods.

Investigations concerning amplitudes, amplitude ratio and periods, ampli- des of P waves, amplitudes of S waves, amplitudes of U_p waves, amplitudes R waves, and amplitudes of P' waves, were carried out and the results are own in tables and figures.--W. Ayvazoglou.

(467) SALT DOMES

By M. F. Knoy

Scientific American, New York, Vol. 144, No. 5, 1931, pp. 308-310.

The importance of salt domes in the oil industry is discussed. The rst step in the search for new oil fields is the discovery of salt domes.

A brief description of the seismic method of prospecting for this pur- se is given.--W. Ayvazoglou.

(468) ON THE HISTORY OF THE SEISMIC METHOD FOR THE INVESTIGATION OF UNDERGROUND FORMATIONS AND MINERAL DEPOSITS

By L. Mintrop

Publications of the Seismos Company, Hannover, Germany, No. 2, 1930,
128 pages.

In the preface to this work Mintrop gives the description of two patents: one by R. A. Fessenden "Method and apparatus for locating orebodies," for which application was made in the United States on April 2, 1914, and the other by the author, with the application on December 7, 1919, for German Reich patent, referring to "Method for the determination of the structure of rock strata." These two patents must, according to Mintrop, be considered epoch-making in the economic history of the method for the investigation of underground formations and mineral deposit by means of elastic waves.

In the last paragraph of the preface Mintrop represents the purpose of writing this history as follows:

> In consideration of the world-wide economic importance of the seismic method, which is protected in 26 countries, and in view of the attacks made by German scientists on the German patent, it appears necessary to give an account of the development of the method and to quote the remarks of scientists and practical men, both before and after the application for patent, as they appeared in professional publications.
>
> The account begins with suggestions for measuring seismic velocities, made by Mallet in 1846-1843, and considers all professional publications until to-day. Furthermore, some letters to the author are published, as they constitute a material contribution to the history of the seismic method.
>
> An alphabetic list of all authors mentioned preceds the test.

Appended is a translation of the decision of the Reich Court of Germany under date of June 28, 1930, in which the charges made against the German Reich patent No. 371963 "Method for the determination of the structure of rock strata," mentioned in the preface, were refuted.--W. Ayvazoglou.

(469) INVESTIGATIONS ON THE THEORY OF THE GALITZIN SEISMOGRAPH

By Jörgen Rybner

Gerlands Beiträge zur Geophysik, Leipzig, vol. 31, No. 1/3, 1931,
pp. 259-281.

The following is a preliminary account of an investigation on the theory of the Galitzin seismograph. The research is based on the extended form of e differential equation given by Wenner, from which the results are derived means of the Heaviside operational calculus.

A general solution for any movement of the soil is obtained in the form a definite integral, and particular solutions are worked out for the movents $x = \sin \omega t$ and $x = 1^{at} \sin \omega t$, both starting at $t = 0$. The results are own in curves, and a method of utilizing such curves for a speedy evaluation the records is sketched.

A general equation for the movement of the galvanometer by the usual termination of the constants is given. Finally, the possibility of improvg the seismograph by altering its constants is briefly discussed.- Author's stract.

(470) THE COMPRESSIBILITY OF FAYALITE, AND THE VELOCITY OF ELASTIC WAVES IN PERIDOTITE WITH DIFFERENT IRON-MAGNESIUM RATIOS

By L. H. Adams

rlands Beiträge zur Geophysik, Leipzig, vol. 31, No. 1/3, 1931, pp. 315-321.

From measurements on the effect of pressure on the volume of (1) a rock nsisting of olivine containing 7 per cent FeO and (2) pure fayalite e$_2$SiO$_4$), it has been found that the compressibility, β, of fosterite gSiO$_4$) is 0.82×10^{-6} and 0.73×10^{-6} per bar, respectively, at atmospheric essure and at 15,000 bars. The latter pressure is equivalent to a depth of out 50 kilometers below the surface of the earth. For fayalite the compressibility is notably higher - namely, 0.96×10^{-6} and 0.84×10^{-6} at 1 and ,000 bars, respectively. The velocity of longitudinal waves through rocks rying in composition between pure forsterite and pure fayalite would there-ore range between 8.6 and 7.1 kilometers per second at a pressure of 15,000 rs. On the reasonable assumption that in peridotite within the earth the lecular ratio of MgO to FeO is about 4 to 1, the velocity of longitudinal ves in this peridotite would be 8.2 kilometers per second at a depth of 50 lometers (disregarding the unknown effect of temperature).

It may be noted that previous measurements on pyroxenes have shown that the enstatite-hypersthene series the variation of velocity with iron-ntent is much less than in the olivine series; the velocity of longitudinal ves at P=15,000 in any enstatite-hypersthene can not be far from 7.4 kiloters per second.--Author's abstract.

4. ELECTRICAL METHODS

(471) EINE APPARATUR ZUR ERZEUGUNG UND MESSUNG NIEDERFREQUENTER ELEKTROMAGNETISCHER WECHSELFELDER

(Apparatus for Producing and Measuring Electromagnetic Alternating Fields of Low Frequency)

By Max Müller

Zeitschrift für Geophysik, Braunschweig, Vol. 7, No. 5/6, 1931, pp. 248-258.

The author describes the construction of a field apparatus for producing and measuring electromagnetic alternating fields of low frequency which enclose the whole range of frequency from 5 to 10^3 Hertz. In the description of the apparatus are included:

A. The Generator.- Three figures show the method of connection, the sender, and a general view of the generator. The sender can be easily transported and does not require any attendance during operation. The current remains constant to within 1 per cent. The frequency of the current, which does not depend on the load, may be changed within the limits from 5 to 10^3 Hertz.

B. The Field Strength Amplifier.- The method of connection and a photographic view of the amplifier are given in pictures.

C. The Receiver.- A diagram of connection designed by the author and two photographic views of the receiver are added.

Good results were obtained from the practical tests carried out with the apparatus. A series of field measurements made by the apparatus will appear in one of the next numbers of "Gerlands Beiträge zur Geophysik."--W. Ayvazoglou.

(472) DIE TIEFENWIRKUNG DER POTENTIALLINIEN = UND RAHMENMETHODEN BEI GESCHICHTETEM UNTERGRUND

(Penetrative Effect of the Potential Line Method and Frame Method in Case of a Stratified Subsoil)

By J. N. Hummel

Zeitschrift für Geophysic, Braunschweig, vol. 7, No. 5/6, 1931, pp. 258-265.

The determination of the most suitable geoelectrical method for the establishment of the depth of a disturbing body is of great importance. This refers especially to the comparison of the potential line method with the frame method, as here the penetrative effect may vary greatly.

In one of his previous works: "Über die Tiefenwirkung bei geoelektrischen umenmethoden" (Zeitschrift für Geophysik, vol. 5, No. 2, 1929, pp. 72-80 - e Geophys. Abs. 9, p. 21), a special case, that of a deposit enclosed in an tirely homogeneous medium, was examined.

In this article Hummel investigates the case of two horizontal layers, the ver containing the disturbing body.

The influence of the upper layer upon the potential line picture on the rface of the earth is examined. The disturbing value is compared with the ue of the corresponding electromagnetic field.

Hummel draws the conclusion that in case the conductivity of the lower ver is greater than that of the upper layer, the penetrative effect by using e frame method is smaller than if the potential line method is used and vice rsa.

Taking into consideration that usually one has to deal with an upper layer good conductivity, generally greater depths can be obtained by using the ame method.--W. Ayvazoglou.

(473) EXPANSION AND PROGRESS OF ELECTRICAL PROSPECTING

By H. Lundberg, T. Zuschlag, and F. Kihlstedt

e Canadian Mining and Metallurgical Bulletin, Montreal, No. 232, Aug., 1931, pp. 932-962.

The discussion presented in this article gives a short outline of the meths of electrical prospecting practiced by the Swedish American Prospecting rporation, as well as some examples of actual investigations.

Fundamental Principles.- Electrical prospecting is the art of exploring e subsoil by observing resistivity variations and interpreting the results such observations in terms of geology. All materials may be classified into nductors, semiconductors, and insulators. The difficulties in practice of the ectromagnetic methods are discussed, and horizontal and vertical field comnents are represented by vector diagrams.

Standard Prospecting Methods and New Developments.- The following three ifferent operations are discussed:

1. Excitation of the area to be investigated;
2. Investigation of the excited area;
3. Interpretation of the electrical observations.

Examples of Practical Results.- As a practical example the authors exmine the oriental orebody at Buchans, where large bodies of high-grade leadinc ore have been discovered by electrical prospecting.

Irrigation and Foundation Projects.- A series of examples (Sillre, Sweden; the Bruner fault; investigations in western Canada carried out by F. Kihlstedt) is described. The article is illustrated by 22 figures.--W.Ayvazoglo

(474) DEPENDENCE OF THE NORMAL EARTH-CURRENT ON LATITUDE

By David Stenquist

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 36, No. 2, 1931, pp. 105-109.

The results of an investigation of the diurnal variation (inequality) of the earth-current as a function of latitude, based on a large number of observations made in Sodankylä and Lund, are given in tables and graphically. This investigation refers to ordinary days - that is, all days excepting those highly disturbed. The inequality for such days does not follow the same laws at high altitudes as at low altitudes. At high latitudes the current is roughly of equal intensity during the day and during the night, and the 24-hour wave is predominant. At low latitudes the day-current is predominant and the 12-hour wave is very evident. Stenquist concludes:

> It is conceivable that diurnal inequalities of the low-latitude type for earth-currents and for the magnetic elements are connected with the ultraviolet radiation of the sun, that the high-latitude type is connected with ordinary auroral rays having diurnal variation, and finally that the magnetic storms are connected with the cosmic rays, which have diurnal variation.--W. Ayvazoglou.

(475) DIURNAL VARIATION OF CONCENTRATION OF CONDENSATION-NUCLEI AND OF CERTAIN ATMOSPHERIC-ELECTRIC ELEMENTS AT WASHINGTON, D. C.

By G. R. Wait

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 2, 1931, pp. 111-131.

Diurnal-variation observations of the concentration of consideration-nuclei in the atmosphere and of certain meteorological elements have been made simultaneously with those of the potential gradient and of the electric conductivity of the atmosphere. The diurnal-variation curve for condensation-nuclei is similar to the general temperature-curve in that high values occur during the daylight hours and low values during the night. The curve is somewhat similar to that for the potential gradient and in a very general way inverse to that for the atmospheric conductivity. The rate of ionization calculated from the linear recombination law, shows a diurnal-variation curve very similar to that for the negative air-earth current as computed from the potentia gradient and the negative conductivity.

The results of this investigation suggest that relative humidity is not large factor in determining the number of nuclei present in the atmosphere. alculated values of negative conductivity by means of both the linear recomination law and the square-root law show fair agreement with the observed alues of the conductivity; neither shows any decided advantage over the other.

Several mechanisms whereby the diurnal variation of potential gradient at ashington may be accounted for through the observed number of condensation-uclei, charged or uncharged, are considered. In view of the known universal haracter of the diurnal variation of the potential gradient, it was considered ecessary to explain only a portion of the diurnal variation through some echanism. On the basis of experimental results it is shown that this portion ay be entirely accounted for through variation in height and in density of a ocal space charge. The necessary variation in height can be satisfactorily xplained through the action of local convention currents in the atmosphere hile the required variation in density can be explained through a variation in he number of condensation nuclei.

Evidence is presented in support of a theory that the secondary minimum n the potential-gradient diurnal-variation curve, occurring at many land tations during the warmest time of the day, is produced through the mechanism f convection-currents in the atmosphere.--Author's abstract.

(476) HOW TO COMPUTE TABLES FOR DETERMINING ELECTRICAL RESISTIVITY OF UNDERLYING BEDS AND THEIR APPLICATION TO GEOPHYSICAL PROBLEMS

By Irwin Roman

. S. Department of Commerce, Bureau of Mines, Washington, D. C., Technical Paper 502, 1931, 44 pages.

In the introduction to this paper Roman summarizes his paper as follows:

> This paper contains a detailed discussion of the derivation and results, with numerical tables in a form convenient for reference, in the case of a single infinite plate separated from two adjacent media by parallel planes. The method is based on a paper by Wenner (A method of measuring earth resistivity: U. S. Bureau of Standards Sci. Paper 258, Oct. 11, 1915, pp. 469-478), using the concept of an apparent resistivity.
>
> Expressions are derived for the potential throughout space, when poles of known strength are located within or on the boundary of a parallel plate. The simple geophysical case is studied in detail, and tables are calculated to facilifate the application of the formulas. In this case, the air is considered perfectly insulating, the upper soil is considered homogeneous, isotropic, and of constant thickness, and the lower bed is assumed to be homogeneous, isotropic,

and of infinite extent. All current poles and potential electrodes are on the surface of the earth. The effect of the lower bed is expressed by a "disturbing factor," the apparent resistivity of the upper bed being the actual resistivity multiplied by this factor. The method of calculation of the tables is discussed in detail. The application of the method and some general results in its practical use are given, together with an example of the calculations."

Contents:

Derivation of formulas: boundary conditions; theory of images; determination of image positions and strengths; values of potentials; reflection factor; grouping terms for computation; determination of pole strength from current.

Special cases; case 1 - double space; case 2 - insulated plate; case 3 - imbedded plate; case 4 - contact case; case 5 - simple geophysical case.

Calculation of W tables for simple geophysical case: survey of calculations; residues for $Q^2=1$; residues for Q^2 1; interpolation; checking.

Applications of simple geophysical case.
Examples of calculations.
Conclusion and summary.
Tables of W values.

The article is illustrated by two figures: (1) Geometrical positions of parallel beds under discussion, and (2) positions of current application and potential observation.—W. Ayvazoglou.

5. RADIOACTIVE METHODS

(477) BEITRÄGE ZUR METHODE DER RADIOAKTIVITÄTS UNTERSUCHUNGEN IN DER ANGEWANDTEN GEOPHYSIK

(CONTRIBUTION TO THE RADIOACTIVE METHOD OF INVESTIGATION IN APPLIED GEOPHYSICS)

By Ferdinand Müller

Zeitschrift fur Geophysik, Braunschweig, vol. 7, No. 5/6, 1931, pp. 241-247.

A series of conditions which are to be taken into consideration during the experiments carried out by the radioactive method of investigation are discussed, new systematic steps are described, and the limits of the sphere of application of these investigations to geophysical prospecting are examined.—Author's abstract translated by W. Ayvazoglou.

(478) MESSUNGEN DER ULTRASTRAHLUNG (DURCHDRINGENDE HÖHENSTRAHLUNG) ZWISCHEN 57 UND 67° NORDL. BREITE.

MEASURING OF ULTRA-RADIATION (PENETRATING RADIATION) BETWEEN THE 57TH AND 67TH DEGREES OF NORTH LATITUDE

By K. Wölcken

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 5/6, 1931, pp. 267-271.

During a trip from Denmark to Greenland in August, 1930, Wölcken measured the penetrating radiation in the region between the 57th and 67th degrees of north latitude. Kolhörster's ionization chamber was used. Data concerning the measurements are given in this article. In spite of constant oscillations caused by the motors of the ship the apparatus worked fairly well. A maximum of the intensity of radiation, as well as its dependency on the geographical and magnetic latitudes could not be established with the insufficient accuracy of measurements obtained, between the 55th and 60th degrees of latitude.—V. Ayvazoglou.

(479) KENNELLY-HEAVISIDE LAYER STUDIES

By P. A. de Mars, T. R. Gilliland, and G. W. Kenrick

Proceedings of the Institute of Radio Engineers, New York, vol. 19, No. 1, 1931, p. 106.

This paper describes progress in a recently inaugurated program of co-operative research for the study of radio transmission. Oscillographic observations of pulse transmissions made at the Bureau of Standards and Tufts College, in collaboration with workers at the Naval Research Laboratory and the Department of Terrestrial Magnetism, are discussed. Observation on 1,410 kilocycles and a number of higher frequencies are described, and oscillograms showing the complex phenomena frequently encountered in night transmission are shown. Evidence in support of the existence of several ionized strata, such as postulated by Appleton and Eckersley, is found, and examples of the pulse distortions frequently encountered in reflection or refraction are shown.

The paper is presented merely as a preliminary report, and solicits the cooperation of others interested in observations of this type. The need of extended observations of varied types is emphasized, and a more extended quantitative discussion of results is reserved for a later communication when more date are available.--Author's abstract.

(480) ÜBER DIE DURCHDRINGENDSTE KOMPONENTE DER ULTRASTRAHLUNG (HESSSCHEN STRAHLUNG)

(ON THE MOST PENETRATING COMPONENT OF ULTRA-RADIATION, HESS' RADIATION)

By E. Regener

Die Naturwissenschaften, Berlin, vol. 19, No. 8, 1931, pp. 177-179.

In this article Regener gives further data concerning his measurements made previously on penetrating radiation by lowering special self-registering apparatus into Lake Constance (Naturwissenschaften, vol. 17, 1929, pp. 183-185; see Geophys. Abs. 7, p. 17).

Direct determinations of the radioactivity of the Lake Constance water carried out by L. Zolotnitzky resulted in 2 to 4.10^{-12} Curie per liter.

In a table the author gives the results of his measurements made at various depths by means of a Geiger-Müller's electron counter.--W. Ayvazoglou.

6. GEOTHERMAL METHODS

(481) DIE ENTSTEHUNG DER KONTINENTE

(THE ORIGIN OF THE CONTINENTS)

By Josef Geszti

Gerlands Beiträge Zur Geophysik, Leipzig, vol. 31, No. 1/3, 1931, pp. 1-39.

The theory of siliceous melting solutions is used for the explanation of the formation of a thermic insulating layer which, by sinking down to the original magma, hastens the congelation of molten rocks and causes on the surface of the earth a temperature difference by which the redistribution of the salic masses and the formation of continental blocks is originated and developed

This thermic insulating layer consists of relatively refractory crystalline original separations which, being the lowest solid layer, protect the rocks of the earth crust situated above it from melting. The existence of the crust is thus secured by this melting layer.

The size of the continents depends on the regional distribution of the admixture in the original magma, on the compensation possibilities of the temperature difference arising, and finally on the weight of vapor masses which settled down later.

The thickness of the crust depends on the increase of density of crystalli original separations, on the density and viscosity of molten rocks into which the crystals are sunken down, and especially on the melting temperature of the original separations.--Author's abstract translated by W. Ayvazoglou.

(482) ABKÜHLUNG UND TEMPERATUR DER ERDE

(THE COOLING AND TEMPERATURE OF THE EARTH)

By B. Gutenberg

Sonderdruck aus dem Handbuch der Geophysik, vol. 2, 1929, 35 pages. Gebrüder Borntråger, Berlin, W. 35.

This special reprint from the "Handbook of Geophysics," vol. 2, contains two chapters dealing with the temperature phenomena of the earth:

Chapter 1. Facts based on observations.
Chapter 2. Theoretical considerations.

The following items are discussed in chapter 1:

1. Measurement of Temperature Inside of the Earth's Crust.- Means of measurement are explained and figures showing the results of a series of measurements are given.

2. The Geothermal Degree.- Tables showing the geothermal degrees in various countries and at various depths are given, and the causes of the variation of these degrees are discussed.

3. Heat Conductivity of Rocks.- Two tables, one showing the heat conductivity as a function of humidity and amount of pores in the rocks and another giving the figures for the heat conductivity of several rocks, as established by various authors, and curves showing the dependency of the heat conductivity on the temperature (according to Wolff) are added.

4. Specific Heat of Rocks.- Figures for a few rocks are given.

5. Melting Temperature and Melting Heat.- A table with figures for the constants of melting curves, according to Wolff, and a melting curve of helium, according to Simon, are given.

6. Temperatures of Lavas; Transformation-Temperatures.- Lava temperatures according to Perret, Day, Jaggar, and Shepherd are collected in a table.

7. Radioactive Substances and the Production of Heat by Them.- Two tables showing (1) the production of heat according to the amount of Ra, Th, and Ka in rocks, and (2) showing the radioactivity of Vesuvius lavas, according to Joly are given. In chapter 2 "Theoretical considerations" the author discusses:

8. The Cooling of the Earth During the Pre-geological Epochs.

9. The Cooling of the Crystalline Earth Crust and the Temperature Resulting From This.- Melting curves according to Wolff; curves showing the cooling of spherical bodies of various substances representing the earth, in one million years, starting with a temperature of 100°, according to Van Orstrand; and curves of the temperature inside of the earth crust, according to Jeffreys, Adams, Wolff, and Gutenberg are given.

10. The Temperature of the Earth Crust Based on Statical Observations.- As a final conclusion the author gives the following probable figures for the temperatures inside of the earth:

Depth, kilometers	20	100	200	500	6370
Temperature	600°	1400°	1600°	1800°	2000-5000°

W. Ayvazoglou.

(483) THE HEAT OF SOLUTION OF SOME POTASH MINERALS

By L. T. Richardson and R. C. Wells

Journal of the Washington Academy of Sciences, Baltimore, Md., vol. 21, No. 11, 1931, pp. 243-248.

Two purposes of this paper are given by the authors:

1. To consider whether measurements of the heat of solution may afford a rapid method of detecting potash minerals or estimating their percentage in gangue material, and

2. To discuss whether the heat of solution may affect the geothermal gradient of such a region as the area of potash deposits in Texas and New Mexico.

The results of investigations obtained by the authors concerning the heat of solution are shown in three tables -

Table 1. Heat of solution of some salts (5-gram sample).
Table 2. Heat of solution of some potash minerals (5-gram sample).
Table 3. Fall in temperature resulting from solution of samples in obtained from successive 3-inch portions of two sections of core from Blanchard Well No. 3.

The second question is that of the geologic application of the heat of solution. The following question is considered by the authors: Are water-soluble salts dissolving in ground water or deep solutions at a rate that would cause sufficient cooling to explain the low gradients? In the absence of any simple direct answer to this question the authors propose to make certain assumptions that appear to be too liberal and show that even so the corresponding effects would be insufficient to explain the gradients observed. Data from the area of the Pecos, Mazos, and Colorado Rivers (Texas), as given in U. S.

Geological Survey water-supply papers, are examined and the authors conclude that: "To produce the present gradients sodium chloride would have to be dissolved at depth at a rate of a layer nearly a centimeter thick each year, a rate that is incompatible with the known geologic age of the deposits."

In other words, the figures indicate that the quantity of heat normally flowing through the rocks of the earth's crust is large in comparison with the heat of any chemical changes that are likely to take place under nearly static conditions due to such transformations as hydration, solution, carbonation, silicification, and replacement."—W. Ayvazoglou.

7. UNCLASSIFIED METHOD

(484) GEOPHYSICS

EDITORIAL NOTE

The Engineer, London, vol. 152, Nos. 3942, 3943, 3944, 3945, 3946, 1931, pp. 112-114, 140-142, 161-163, 200-202, 213-214.

In this series of articles the author describes geophysical methods of prospecting, illustrating them with diagrams showing examples of the results of the surveys, and with photographs of some instruments used in each method. The following methods are described:

1. The magnetic method;
2. The gravitational method;
3. The electrical methods (the spontaneous polarization method, resistivity methods, the equipotential line method, electromagnetic methods); and
4. The seismic method.

The author concludes the series of articles with a brief discussion on the relative uses and applications of the various methods and the place that they must take in physics and geology: The magnetic method finds its place in the equipment for any kind of geophysical surveying as it is very rapidly operated and the instruments can be handled without any special training; the places in which it can be used are limited to those in which materials with fairly well-pronounced magnetic properties exist.

The gravitational method is not so limited as to the nature of the materials by which it is affected, but it suffers from the influence of topographical features. The method has the advantage that its theory is complete and well understood, so that the interpretation of the results are less open to doubt. It is of no use where stratified structures exist but is particularly useful for the delimitation of comparatively small features such as coal beds, which are not susceptible to mapping by other methods.

All types of electrical methods suffer from the disadvantage that the strength of the electrical indications falls off rapidly with the increase of the depth explored, 500 feet being approximately the depth below which no indications can be regarded as reliable. The methods are suitable for detailed investigations rather than large-scale surveys.

The seismic method is well suited for large-scale survey and is particularly valuable where stratification exists. It has been used with great success for the discovery of salt domes in the neighborhood of which oil is to be found.—W. Ayvazoglou.

(485) ÜBER DIE ANORDNUNG DER OPTIK BEI LICHTSCHREIBER - REGISTRIERAPPARATEN

(ON THE ARRANGEMENT OF LENSES IN AN APPARATUS WITH PHOTOGRAPHIC REGISTRATION)

By Johannes Picht

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 5/6, 1931, pp. 265-266.

In this paper the author describes the rules recommended by the scientific division of the Askania-Werke of Berlin which are to be observed in mutual arrangement of the galvanometer lens, the cylinder lens and the photographic paper in registering instruments, as these rules vary to a certain degree from those described in Angenheister's "Geophysik," vol. 25, Part I, p. 583.

According to the latter the cylinder lens, secured in front of the registering apparatus, should be placed in the focal plane of the spherical lens (focal distance f_s) situated in front of the movable mirror, and the photographic paper should be at a distance from the cylinder lens equal to its focal distance f_z.

According to investigations made by the Askania-Werke the rules are as follows: The cylinder lens must be first removed entirely and the image of the slit must be adjusted on the photographic paper as a sharp line. After this the cylinder lens must be inserted in such a way that its distance from the photographic paper will be a little greater than its focal distance. The accurate distance can be calculated according to the formula

$$\frac{1}{2} f_s \left(1 - \sqrt{1 - 4\frac{f_z}{f_s}}\right)$$

By observing the latter rule the distances, in case $f_s = 100$ centimeters and $f_z = 5$ centimeters, will be

Galvanometer lens ⟶ cylinder lens = 94.72 cm.
Cylinder lens ⟶ photographic paper = 5.28 cm.
Galvanometer lens ⟶ photographic paper = 100.00 cm.

y using the rules given by Angenheister these figures will be 100 centimeters, centimeters, and 105 centimeters, respectively.--W. Ayvazoglou.

(486) SOME OBSERVATIONS ON GEOPHYSICS

By Ronald K. De Ford

nternational Petroleum Technology, Cleveland, Ohio, vol. 8, No. 3, 1931, pp. 46-52.

After the discussion of various opinions on the value of different methods f geophysical prospecting the author concludes that all these geophysical ethods, where successful, give indications of structure and that the geological nterpretation must decide whether the structure is a likely one.--W.Ayvazoglou.

(487) CONTRIBUTION TO THE HISTORY OF GEOPHYSICAL RESEARCH WORK AND PROSPECTING IN CENTRAL ASIA (IN RUSSIAN)

By R. R. Zimmerman

lletin of the Regional Geological and Prospecting Service in Central Asia, Tashkent, No. 3, Oct. 1930, pp. 3-12.

A brief review of the history of magnetic, seismic, gravimetric, electroagnetic and radiometric work carried out in Central Asia is given.

Magnetic Work.- Magnetic observations made since 1848 and the development f this work which finally resulted in the creation in 1925 of a special station t the Tashkent Geophysical Observatory is mentioned.

Seismic Work.- Systematic study of seismic phenomena in Central Asia has een started in 1889, the year of a great earthquake in Chiliksk. The Tashkent stronomical and Physical Observatory was provided in 1900 with a Zöllner eismograph. A series of seismographs were distributed among other seismic tations in Turkestan besides.

The following seismic stations are in operation at present: Samarkand, ince 1925; Alma-ata, since 1927; Frunse, since 1927; Andijan, since 1928; and skhabad. All these stations were provided with light pendulums of Nikiforov's ype (natural period - 3 sec., magnification 400 to 800 and photographic registration). The first seismic prospecting for oil was carried out in 1930 in the il-bearing regions of Temir and Chikishliar. Four field seismographs Schweydar) were used.

Gravimetric Work.- Twelve expeditions, covering 20,000 kilometers worked during 1901-1908 using Sterneck's pendulum apparatus. Measurements were made at about 150 points. After an interruption of about 20 years a more regular work was started again in 1928.

Electrical Methods of Prospecting.- Electrical prospecting was started in 1928. The work has been continued up to the present time mostly for the determination of the sulphuric deposits of copper ores in the region of the Kzil-Ordinsk district. A considerable number of anomalies caused by the origin of the ore have been discovered.

Radiometric Work.- The study of radioactive phenomena in Central Asia is conducted along the following three main lines: Geophysical, balneological, and geological. Atmospheric radioactive phenomena are studied at the Geophysica Observatory in Tashkent; the work concerns the study of the radioactivity of the atmospheric air and the radioactivity of sediments.--W. Ayvazoglou.

(488) MAGNETIC AND GRAVIMETRIC SURVEY OF THE ANOMALOUS GRAVITY REGION OF MOSCOW

By D. W. Pjaskovsky, F. G. Newsky, M. P. Dobrokhotova, and W. A. Uspensky

Moscow, Institut des Recherches Géophysiques, Bull., Geophys. No. 31, Travaux de l'Observatoire Géophysique a Kontchino, 1929, 140 pp.

An abstract of the pamphlet is given by H. D. Harradon in the Terrestrial Magnetism and Atmospheric Electricity, vol. 36, No. 2, 1931, p. 148. The abstract reads as follows:

> The first and larger part of this publication contains the results of gravity-determinations made in the vicinity of Moscow during the years 1924 and 1925.
>
> The latter part, consisting of about 40 pages, contains the results of the magnetic observations which were made contemporaneously with the execution of the gravimetric survey. The practice was followed of selecting two magnetic stations lying at a rather short distance from each other, corresponding, in general, to each gravity station. The observations were made by Newsky and Dobrokhotova, both connected with the Observatory of Kutchino near Moscow. Detailed descriptions of the various points where magnetic determinations were made (31 in number) are given. The results themselves are found in tables reduced to the epoch 1925.0 on the basis of data from the Observatory of Kutchino. Isomagnetic charts of the Moscow region, based on the above-mentioned results, have been constructed and are given at the end of the pamphlet.

The instruments used in the magnetic survey were as follows: Magnetic theodolite (new pattern) No. 168; magnetic theodolite (Cooke) No. 19; Dover dip circles Nos. 209-210; Hildebrand theodolite No. 4160 (small model); Nardin chronometer No. 649. The constants of theodolites Nos. 19 and 168 were determined by comparison with the magnetometer at the Slutzk (Pavlovsk) Observatory, the results of the comparison being given in a table.

A study of the results of the survey of the Moscow region makes possible the construction of magnetic charts showing the presence of an anomaly the central point of which lies to the southwest of Moscow. Here the greatest departures from the normal values of the magnetic elements of the region surveyed are found.

An inspection of the charts discloses a certain correlation between the anomaly of gravity both as regards the extent and the width of the anomalous strip, and this correlation is indicated by the character of the distribution of the isomagnetic lines for all the elements.--W. Ayvazoglou.

(489) SCIENCE IN SEARCH OF OIL

EDITORIAL NOTE

Scientific American, New York, vol. 145, No. 1, 1931, pp. 34-36.

A brief description of seismic, magnetic, and gravitational methods of rospecting is given. The author concludes that the chances of failure in rilling for oil are greatly reduced by geology, geophysics, paleontology, nd other allied sciences.--W. Ayvazoglou.

(490) ETUDE DE L'INFLUENCE DE QUELQUES FACTEURS GÉOPHYSIQUES SUR LES POINTS DE CHUTE DE LA FOUDRE

(STUDY OF THE INFLUENCE OF SOME GEOPHYSICAL FACTORS UPON THE POINTS STRUCK BY LIGHTNING)

By L. Bogoiavlensky

e Journal de Physique et le Radium, Paris, vol. 2, No. 4, 1931, pp. 101-114.

The author describes the investigations made on the conductivity of at-
ospheric air and of the soil in places often struck by lightning. Four dif-
erent methods were applied: (1) Radioactive prospecting according to pene-
rating radiation; (2) measurements of the electric conductivity of atmos-
heric air by Gerdien apparatus; (3) electrical prospecting by using artifi-
ial electric field; and (4) electrical prospecting by using natural electric
ields. Conclusive results were obtained from the first three methods by
hich it was shown that in the regions often struck by lightning the values
f the intensity of terrestrial penetrating radiation and of the electrical

conductivity of atmospheric air were always higher. The electric conductivity of the ground determined is in correspondence with the places in which the intensity of penetrating radiation reaches its maximum.

The experiments were carried out in two different places located at 200 kilometers from Leningrad on sedimentary rocks (clay and sandstone) of the Devonian age covered with deposits of the glacial epoch in the form of pebble-stone crystalline rocks.--Author's abstract translated by W. Ayvazoglou.

(491) THE DEPARTMENT OF GEOPHYSICS

By C. A. Heiland

Quarterly of the Colorado School of Mines, Golden, Colorado, vol. 26, No. 1, Sup. A., Aug., 1931, 32 pp.

The scope of geophysical work and the successes of geophysical prospecting during the past five to ten years have created an urgent need for men trained in this branch of science. For the purpose of making available men trained in geophysical prospecting, as well as for the further research in the development of instruments and technique, and for the determination of the geological possibilities and limitations of geophysical methods, a Department of Geophysics was organized in 1926 at the Colorado School of Mines.

The description of this organization given by Heiland in the pamphlet "The Department of Geophysics" concerns the following items. The number of men trained; positions available for geophysicists; general statement about courses; time required for geophysical studies; fees and expenses; fellowship; equipment available (the equipment represents an investment of over $25,000); texts used and arrangement of courses.

A selected list of books and journals giving information on geophysical methods is added.

The pamphlet is illustrated by photographs.--W. Ayvazoglou.

(492) GEOPHYSICAL EXPLORATION FOR OIL CONTRASTED WITH DOODLE-BUG IDEA

By Charles N. Gould

The Oil and Gas Journal, Tulsa, Oklahoma, vol. 29, No. 40, 1931, p. 94.

In comparing the usual type of doodle-bug instrument with the various types of geophysical instruments, Gould mentions the difference between them, the first one being not built on scientific principles and not operated by a scientist, while the geophysical intruments are constructed on definite scientific laws and must be operated by scientists.

The four chief types of geophysical instruments - the torsion balance, agnetometer, seismograph, and gravity pendulum - all based on principles of physics, are mentioned.

In spite of the fact that the geophysical instruments do not find oil, nd that interpretation of structural conditions of the subsurface rocks is ot always possible, the author says that between 30 millions and 40 million ollars have been spent by oil companies in geophysical work during the past en years.—W. Ayvazoglou.

9. NEW BOOKS

(493) BIENNIAL REPORT OF THE STATE GEOLOGIST OF MISSOURI, 1931. Rolla, Mo., 1931, pls. 14, p. 151.

By H. A. Buchler

The report contains an appendix on Geophysical Prospecting.

(494) THEORY OF THE TECTONIC GRAVIMETRIC INVESTIGATION

By Mekel, J.A.A., Mining Engineer

Thesis for degree of Doctor of Technology, at Delft, March, 1928. Translated from the original Dutch by M. Walter Pesman of Denver, Colo. 89 pages - imeographed, illustrated with diagrams. Price $2. A limited number of copies vailable through F. B. Robinson, stationer, Golden, Colo. Prepared through he Departments of Mechanics and Geophysics, Colorado School of Mines, Golden, olo.

(495) PHYSICS OF THE EARTH - III. METEOROLOGY

Bulletin of the National Research Council, Washington, D. C., No. 79, 931, xi - 289 pp., 101 figs. Price $3; cloth, $3.50. Prepared under the uspices of the Subsidiary Committee on Meteorology, under the chairmanship f Herbert H. Kimball. Contents of the book:

Introduction (Development of the science of meteorology), by H. Kimball.

Chapter I. The atmosphere; origin and composition, by William J. Humphreys.
Chapter II. Meteorological data and meteorological changes, by Alfred J. Henry.
Chapter III. Solar radiation and its role, by H. Kimball.
Chapter IV. The meteorology of the free atmosphere, by Willis R. Gregg, L. T. Samuels, and Wilby R. S. Stevens.
Chapter V. Dynamic meteorology, by Hurd C. Willett.
Chapter VI. Physical basis of weather forcasting, by R. H. Weightman.

10. PATENTS

(496) APPARATUS FOR THE STUDY OF THE EARTH'S CRUST

Olvin H. Gish, of Somerset, Chevy Chase, Md., assignor to Carnegie Institution of Washington, of Washington, D. C., a corporation.

United States Patent 1,813,845 Patented July 7, 1931.

This patent discloses a method and apparatus for taking electrical readings involving the electrical current and potential as it passes through a given section of the earth's crust. The invention relates to an apparatus consisting of a source of current, an instrument for measuring the value thereof, a potentiometer, a double rotor commutator, leads from each rotor of said commutator to the earth, leads from one of said rotors to the current measuring instrument and the source of current, and leads from the other rotor of said commutator to the potentiometer. Claims allowed-7.

(497) GEOPHYSICAL METHOD AND APPARATUS

Harvey C. Hayes, of Washington, D. C.

United States Patent, 1,814,444 Patented July 14, 1931.

The present invention has to do primarily with improvements in methods and apparatus depending upon elastic qualities of various types of earth structure. The method comprises the generation of compressional waves below the surface, and the detection of such waves at a plurality of stations at substantially the same time, some of the stations being arranged in substantially a straight line and at least one of the stations being arranged at a side of the point where the compressional waves are generated opposite those stations arranged in a straight line.

The apparatus involved in this invention serves for detecting and recording compressional waves set up in the earth's surface, including a plurality of vibration detectors, a recorder having separate record controlling elements for each of the detectors, and means for affecting one of the elements to produce a record at the instant of generation of the waves.

Claims allowed - 11.

(498) MEANS FOR MEASURING TEMPERATURE IN BOREHOLES

Frederick W. Huber, of Riverside, Calif.

United States Patent, 1,818,221 Patented Aug. 11,1931.

The present invention depends upon the application of the thermoelectric current created by temperature upon two dissimilar metals in contact. The apparatus for measuring temperature in boreholes, involved in this patent, ontains a casing and a receptacle therein for a body of material adapted to aintain constant temperature; thermo-electric means, having junctions in heat ransmitting relation with the constant temperature body and junctions adapted o be brought into heat transmitting relation with the body whose temperature s to be measured; cable means for supporting and suspending said casing for ringing the thermoelectric means to the location at which the temperature easurement is to be taken, the cable including electric conductors connected o the thermoelectric means; and electrical measuring means connected to the able conductors to measure the potential difference thereof.

laims allowed - 3.

(499) METHOD FOR DETERMINING THE CHARACTER OF OREBODIES

ohn J. Jakosky, of Los Angeles, Calif., assignor to the Radiore Co., of Los Angeles, Calif., a corporation of California.

nited States Patent, 1,818,331 Patented Aug. 11, 1931.

This invention relates to electrical methods for obtaining information egarding underground orebodies whose electrical conductivity is relatively igh as compared with that of the surrounding rock or earthy material - particuarly to methods known as "inductive methods." The invention concerns the ethod of determining the location of a fault or break in an orebody, which nduces current flow in the orebody by cutting it with a primary electromagnetic ield, noting the effect at points removed from the source of the electroagnetic field in a direction lengthwise of the orebody of the secondary electroagnetic field produced by such induced current flow, causing the primary lectromagnetic field to have at different times a relatively low frequency and relatively high frequency, varying the position of the source of the primary ield and the point of noting the effect of the secondary field and observing n each case the relative effect of the secondary field for each frequency of rimary field. Thus a position is located such that if the source of the rimary field and the point of noting the effect of the secondary field are at he same side of such position the secondary field is of noticeable intensity t both high and low frequency, while if the source and point are at opposite ides of such position the secondary field at low frequency is either not oticeable or is of much less intensity than at high frequency.

laims allowed - 1.

(500) DEVICE FOR MEASURING SLIGHT FORCES

Hugo Gornick, of Charlottenburg, Germany

nited States Patent 1,819,089 Patented Aug. 18, 1931.

This invention relates to a device for measuring slight forces by asceraining the torsion produced in a thread. The device consists of a torsion thread, a rigid scale system suspended by the torsion thread, and of a balance beam and two weights which are in different horizontal planes, one of the weights being placed above the level of the balance beam.

Claims allowed - 5.

(501) MAGNETOMETER

Seizo Shimizu, of Tokyo, Japan

United States Patent, 1,819,797 Patented, Aug. 18, 1931.

The present invention concerns a magnetometer for determining a magnetic field for the adjustment of a magnetic compass, comprising a coil of predetermined size through which current is passed to set up a magnetic field, means for measuring the current through the coil, a magnetic compass horizontally positioned in the field of the coil and provided with a vertically adjustable mounting rotatable about a vertical axis, and indicating means for determining the several adjustments of the compass.

Claims allowed - 2.

(502) ELECTRICAL PROCESS AND APPARATUS FOR THE DETERMINATION OF THE NATURE OF THE GEOLOGICAL FORMATIONS TRAVERSED BY DRILL HOLES

Conrad Schlumberger, of Paris, France, assignor to Societé - de Prospection Electrique Procedés Schlumberger, of Paris, France, a corporation of France

United States Patent, 1,819,923 Patented, Aug. 18, 1931.

The present invention relates to an electrical process and an apparatus or system for determining the geological formations traversed in drilling operations without the help of a mechanical coring device, as used up to the present day.

The process consists in replacing the mechanical coring by the measurement of the electrical specific resistivity of the different rocks traversed, the measurement taking place inside the drill hole, at different depths. The apparatus for carrying out this process consists of a measuring instrument - a potentiometer, for example - placed at the surface of the soil and connected by insulated wires to one or more electrodes at different depths in the water which normally fills the drill hole.

Claims allowed - 4.

.C.6575.

(503) METHOD AND APPARATUS FOR SUBSOIL INVESTIGATING

arl Sundberg and Erik David Lindblom, of Stockholm, Sweden, assignors to
Aktiebolaget Elektrisk Malmletning, of Stockholm, Sweden,
a company of Sweden

nited States Patent, 1,820,953 Patented Sept. 1, 1931.

The present invention relates to a method of discovering and determining he position, configuration, and nature of ores, solutions of salts, or other odies by ascertaining and investigating the disturbances which such bodies roduce in an electromagnetic field. An apparatus for carrying out this method s included, also.

The method consists in producing an electromagnetic field and determining t at different points and in any desired direction as regards strength and hase by compensating the electromagnetic field by means of another field.

The apparatus can produce an electromagnetic field and also another field or compensating such electromagnetic field.

laims allowed - 10.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6583."

[2] Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(504) GRAVIMETRICAL SURVEY IN THE GROZNY REGION DURING 1929 (IN RUSSIAN)

By A. N. Stepanov

Neftianoe Khoziaystovo, Moscow, vol. 20, No. 4-5,
1931, pp. 360-373

Two surveys carried out by two parties, one in the region of Mozdok and the other near Petrovsk, are described. Two Schweydar-Bamberg variometers, model Z 30, Nos. 562 and 563, and one of Russian design No. 237 were used by the first party. The second party used two Bamberg variometers, model Z 30, Nos. 543 and 544. Before starting the work, careful examination of the density of the upper layers of the soil and of the densities in the ground taken from boreholes was carried out by means of samples. These densities are shown in two tables, respectively. Both Bamberg instruments used by the first party worked well, and more than 700 points were mapped. The gradients of gravity and curves of anomalies are given in a series of figures. The results of the survey are summed up by Stepanov as follows:

1. In the region to the north of the Terek an increase of gravity was observed. The reason is attributed to the elevation of the primitive rocks along this whole extent.

2. Gravitational anticline observed proved the existence of a determined geological structure.

3. The nature of this structure, as well as its depth, could not be determined.

4. Elevation of formations in the western direction has been observed also, thus making the picture in the western part of the area investigated more complicated.

The continuation of the survey to the west and north of the area examined is desirable.--W. Ayvazoglou.

(505) DETERMINATION OF THE INTENSITY OF GRAVITY IN THE REGION OF THE MOSCOW GRAVITATIONAL ANOMALY IN 1926 (IN RUSSIAN)

By N. N. Pariysky and L. V. Sorokin

Bulletin de l'Association de recherches scientifiques à la faculté des sciences de l'Université de Moscou, vol. 3, No. 1-2-13, 1930, pp. 3-35.

In this article the authors publish the results of observations made in 1926 in the region of Moscow on the determination of the intensity of gravity. Six stations were investigated. Characteristic properties of observations at every point are given. The data obtained are represented in a series of tables.

ormulas used for adjustments with regard to amplitude, temperature, density of ae air, and the chronometer are derived. From the diagram showing the results f observations the authors draw the conclusion that the positive anomaly exends in the northern direction for at least 65 kilometers from the Moscow bservatory. The course of the anomaly to the south of Moscow has also been onsiderably improved.—W. Ayvazoglou.

(506) ZUR ANALYSE DER POLFLUCHTKRAFT

(CONTRIBUTION TO THE ANALYSIS OF THE POLFUCHT-FORCE)

By Hans Ertel

Gerlands Beiträge zur Geophysik, Leipzig, vol. 32, No. 1, 1931, pp. 38-46.

In this article the author derives a new formula for the "Polflucht"-forc a force striving to move continents toward the equator — equatorward-force):

$$K_{\varphi} = 2\, m\omega^{2} \delta\, n \sin(2\varphi) \left(1 - \frac{3}{4} \frac{\varsigma}{\varsigma_{m}}\right).$$

The different result from the formula derived by Epstein,

$$K_{\varphi} = \frac{3}{2} m \; {}^{2} \delta\, n \sin(2\varphi),$$

s explained by a false treatment of the gravitational potential.—W. Ayvazoglou.

(507) DIE BESTIMMUNG DES GEOIDS AUS SCHWERKRAFTWERTEN

(DETERMINATION OF THE GEOID FROM GRAVITY VALUES)

By F. Hopfner

Gerlands Beiträge zur Geophysik, Leipzig, vol. 32, No. 1, 1931, pp. 412-417.

The author develops a mathematical method for the determination of the eoid based on Brun's theorem.--W. Ayvazoglou.

(508) DREHWAAGEN NACH EÖTVÖS-SCHWEYDAR

(TORSION BALANCES ACCORDING TO EÖTVÖS-SCHWEYDAR)

Editorial Note

Petroleum Zeitschrift, Berlin, vol. 27, No. 23, 1931, pp. 428-432.

Detailed descriptions of (1) the large torsion balance according to Eötvös-chweydar and (2) the small torsion balance according to Schweydar, as manuactured by the Askania-Werke, Berlin, are given. Figures showing the sections f the two balances are added.--W. Ayvazoglou.

(509) DIE BEARBEITUNG UND DEUTUNG VON DREHWAAGENMESSUNGEN

(WORKING OUT AND INTERPRETATION OF TORSION BALANCE SURVEYS)

By Hans Hlauschek

Petroleum Zeitschrift, Berlin, vol. 27, No. 27, 1931, pp. 510-520.

Based on well-known figures on the discovery of salt domes by geophysical methods of prospecting (torsion balance and seismograph), especially on the Gulf Coast of Texas and Louisiana, the author emphasizes the economical importance of applied geophysics.

In this article Hlauschek discusses in detail how the interpretation of the data obtained by measurements carried out by a torsion balance should be done in order to obtain the best results. The items of this discussion are as follows:

1. Calculation of disturbance values, their compensation, drawing of isograms.--Examples are given.

2. Interpretation of isograms.--The examination of this important question is illustrated by many figures.

3. Construction and interpretation of gradient curves.

4. Construction and interpretation of the anomaly curve.

The analytical method according to Eötvös' formula and the graphical methods published by Barton, Haalck, and Heiland, are mentioned.

In conclusion the author recommends representation by isograms, in case large areas are measured, as a most important basis for interpretation; the construction of gravitational curves is to be preferred in case profile measurements are used.--W. Ayvazoglou.

2. MAGNETIC METHODS

(510) THE MAGNETISM OF THE EARTH

By J. A. Fleming

The Scientific Monthly, New York, vol. 33, July to December, 1931, pp. 74-77

This brief discussion on the magnetism of the earth was presented by Dr. Fleming, acting director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington, over the Columbia Broadcasting System. Some historical data on the discovery of the magnetic property of the lodestone are given; the development of the magnetic compass, investigations on the earth's magnetism, magnetic surveys, observatories, surveys at sea (non-magnetic ship

rnegie), relation between sun-spot activity and disturbances of the earth's
gnetism, studies regarding the Kennelly-Heaviside layer and, finally, pene-
ating radiation were mentioned in connection with the main subject, the
gnetism of the earth.--W. Ayvazoglou.

(511) RELATION BETWEEN THE POTENTIAL AND ITS GRADIENTS ON A SPHERICAL SURFACE AND ITS APPLICATION TO THE THEORY OF TERRESTRIAL MAGNETISM (IN RUSSIAN)

By N. R. Malkin

Bulletin of the Academy of Sciences of the U.S.S.R., Leningrad,
No. 8, 1930, pp. 739-755.

A detailed mathematical discussion is given by Malkin on the following
ems:

1. Formulas expressing the potential and its tangential derivatives by
s vertical gradient.

2. The reverse problem: Definition of Z and V by X and Y given on a
herical surface.

3. Second derivatives of the potential.

4. Internal and mixed spherical problem.--W. Ayvazoglou.

(512) RELATION BETWEEN THE GRADIENTS OF NEWTON'S POTENTIAL ON A PLANE AND ITS APPLICATION TO THE STUDY OF GRAVIMETRIC AND MAGNETIC ANOMALIES (IN RUSSIAN)

By N. R. Malkin

lletin of the Academy of Sciences of the U.S.S.R., Leningrad, No. 8, 1930,
pp. 757-771.

The author presents a detailed mathematical discussion on the following:

1. Formulas expressing the elements of the potential by its vertical
adient.

2. The reverse problem: Quantity Z expressed by X and Y.

3. Application of general formulas for the solution of various problems
ising during the working out of observations.

4. Preparation of general maps of magnetic and gravitational elements and
scovering of new anomalies.--W. Ayvazoglou.

(513) A GEOMAGNETIC SURVEY OF THE BAUXITE REGION IN CENTRAL ARKANSAS

By Noel H. Stearn

Arkansas Geological Survey, Little Rock, Bull. 5, Nov. 15, 1930, 16 pp.

Contents:

Investigation and acknowledgments.
Purpose.
Location of the bauxite region.
Geology of the region.
Origin of the bauxite deposits.
Exploration of the region (the magnetic method of exploration, application of the method to the bauxite region, magnetic depth finding.)
The magnetic survey (procedure, results).
Conclusions.
Bibliography.

Author's abstract reads as follows:

The known deposits of bauxite in central Arkansas are genetically and geographically related to the known masses of igneous rock. It follows that the discovery of hitherto unknown igneous masses in this area may mean the discovery of associated deposits of bauxite. The known igneous masses have been exposed by post-Tertiary erosion. Drilling has shown that erosion has not proceeded far enough in the area to expose all the igneous masses which are flanked with bauxite deposits, and it is possible that there may be buried igneous masses as yet unknown which may also be associated with bauxite. The discovery of pronounced magnetic anomalies associated with isolated exposures of igneous rock in the region suggested that concealed igneous masses might be located by the magnetic method. A reconnaissance survey was therefore made over an area of approximately 1,100 square miles. Although the presence in the region of magnetic anomalies of different orders of magnitude complicates the interpretation of the results, the survey furnishes a body of data which supplements the known geological facts in such a way as to permit two inferences:

1. That the potential bauxite-bearing region in central Arkansas can be extended to include an area of at least 165 square miles.

2. That beneath the Gulf Coastal Plain in central Arkansas there lies an igneous province, nearly 400 square miles in extent, fringed with plugs and dikes of basic igneous rock.

Maps and diagrams illustrate the article.--W. Ayvazoglou.

14) LOCAL TERRESTRIAL MAGNETISM IN JAPAN PROPER AND HER POSSESSIONS (IN JAPANESE)

By Asaiti Muramoto

Suiro Yōhō (Hydrographic Bulletin), Tokyo, No. 9, 1930, pp. 73-78.

The magnetic declination should be disturbed about 1° near Japan, when the st or west force of the local disturbance amounts to 500 γ. As the local gnetic disturbance is generally confined within narrow extent, it is reason-ly considered that some parts of an equipotential curve of the local dis-rbance run parallel with the meridian and consequently the disturbance of the clination of about 1° will be found near the place where the horizontal mponent of the local disturbing force is 500 γ. The places where the rizontal component of the local disturbing force reaches over 450 γ are tabu-ted from the total data surveyed up to date in Japan proper and her possession d the density of such local disturbance is described. Moreover, it is ex-plified that the local disturbance has no remarkable change for an interval 10 or 18 years.— Author's abstract reprinted from the Japanese Journal of tronomy and Geophysics, vol. 8, No. 3, 1931.

(515) RESULTS OF WEEKLY OBSERVATIONS OF TERRESTRIAL MAGNETISM AT ZINSEN TAIHOKU OTOMARI AND PALAU IN 1929 (IN JAPANESE)

By Asaiti Muramoto

Suiro Yōhō (Hydrographic Bulletin), Tokyo, No. 9, 1930, pp. 195-199.

The synthetic results of weekly observations of magnetic declination at e meteorological stations at Zinsen, Taihoku, Otomari, and Palau during 1929 e shown graphically to serve as data for reducing the annual and secular riations at Taihoku and Otomari have remarkably decreased and it seems that e declination came gradually near its own maximum value.— Author's abstract printed from the Japanese Journal of Astronomy and Geophysics, vol. 8, No. 3, 31.

(516) SOLUTION OF THE INVERSE MAGNETOMETRIC PROBLEM FOR THE CASE OF ONE CONTACT SURFACE (A CASE OF MASSES DEPOSITED IN LAYERS) (IN RUSSIAN)

By N. R. Malkin

omptes Rendues de l'Académie des Sciences of the U.S.S.R., 1931, pp. 231-235.

Simple cases of bodies of regular geometrical shape (parallelepiped, llipsoid, etc.) had already been examined by various authors based on the well-nown theory of the potential. The following problem is discussed in this rticle: To determine the depth h of a homogeneously magnetized layer (by in-uced magnetism) limited from above by a plane and from below by a contact sur-ace $Z = h\ (x, y)$, where x, y and Z are the usual Descartes' coordinates, the zero point of which is situated somewhere on the upper plane, the O_z axis perpendicular to it and directed downward, h (x, y) being the function, and where the values of the magnetic potential V are assumed to be known along the whole plane. This case may occur if the magnetized crystalline rocks are covered with sedimentary rocks of weak magnetization and are limited by the contact surface Z = h (x, y).

A mathematical discussion of this case is given. The case of several contact surfaces may be brought to that of one contact surface by using some general assumptions.--W. Ayvazoglou.

(517) À PROPOS DES MÉTHODES MAGNÉTIQUES EMPLOYÉES JUSQU' À CE JOUR DANS LA RECHERCHE DES GISEMENTS PÉTROLIFÈRES

(CONCERNING MAGNETIC METHODS APPLIED UP TO THE PRESENT IN THE SEARCH FOR OIL DEPOSITS)

By A. Belluigi

La Revue Petrolifère, Paris, No. 443, September, 1931, pp. 1281-1284

Tasks of geomagnetic problems and means for interpreting the data obtained by the magnetic method of prospecting are briefly summed up.

Development of new ideas in this method and decisions as to what really can serve for prospecting oil are discussed. A few examples showing the possibilities which can be applied in the vast field of geophysics are given.--W. Ayvazoglou.

3. SEISMIC METHODS

(518) SOME CONSIDERATIONS REGARDING THE CONSTRUCTION OF ISOCHRONES OF EMERGENCES OF SEISMIC WAVES IN SURVEYING INTRUSIVE DEPOSITS (STOCKWORK) (IN RUSSIAN)

By B. Sabin-Gus

Bulletin of the Geological and Prospecting Service of the U.S.S.R., Leningrad, vol. 50, No. 14, 1931, pp. 173-193.

Considerations on the construction of isochrones, that is, curves of equal times of emergence of seismic waves, during a seismic surveying are discussed. An intrusive deposit is considered.

For the solution of this problem all the equations were deduced on the basis of the principal rules of geometrical optics and on the principle of brachystrochroneity (that is, the path for which a minimum time is required).

Chapter I. The simplest case, that of an intrusive deposit having the hape of a rectangular parallelepiped surrounded by rocks with different lastic properties, is discussed. The system is overlaid by a horizontal bed ith a smaller rate of propagation of seismic waves as compared with underlying ocks.

The seismic waves which reach the points located in the region explored re subdivided into a series of classes according to the paths along which they re propagating. Accordingly, the whole surface under exploration is subivided into a series of regions with waves of various classes. These regions re separated by lines called the "boundary contours" of the given classes. ive classes of waves are distinguished. A map of isochrones showing the oundary contours is given.

Chapter II. The preceding case is complicated by assuming the vertical oundary of the intrusive deposit to be composed of a series of planes oriented n all possible directions with respect to the point of explosion.

Chapter III. Considerations of a case with vertical walls and inclined pper surface are discussed.--W. Ayvazoglou.

(519) THE RADIO-SEISMOGRAPH

By Seizo Maeno

apanese Journal of Astronomy and Geophysics, Tokyo, vol. 8, No. 1, 1931, pp. 39-50.

An abstract of this article is given by A. Imamura in the same journal, ol. 8, No. 3, 1931, p. 33. It reads as follows:

> The instrument consists of the following parts: (1) A first oscillator with a variable capacity specially constructed with a horizontal or vertical pendulum; (2) a second oscillator with a capacity unaffected by earth movements; (3) an amplifier, which gives changes in the current output proportional to changes in the beat-frequency of the two oscillators; (4) an oscillograph. The vacuum tubes and other parts of the instrument are all of special construction.
>
> The merits of the instruments are as follows:
>
> 1. In registering the motion of the earth the principles of wireless telegraphy are availed of, although the method with wires can also be used. With the former method it is possible to register the motion of the earth at any place where a bulky equipment with recorders, etc., can not very well be installed, by simply installing there a first oscillator and the rest of the apparatus elsewhere favorably situated for observations.

2. Its great stability, unaffected by voltage variations of the batteries.

3. The wide range of the magnification -- 0 to 100,000,000 times.

4. The magnification can be calibrated by a special device.

5. The magnification is practically uninfluenced by the earth's period of motion.

6. Such constant disturbances as tend to obscure the principal earth motion that is being sought can be eliminated;

7. Without any adjustment of the pendulum, displacements of its zero point caused by tiltings of the earth and other disturbances can be eliminated by merely changing the frequency of the second oscillator.

8. Its compactness and portability due to its small size. -- W. Ayvazoglou.

(520) THE REVISION OF SEISMOLOGICAL TABLES

By Harold Jeffreys

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 2, No. 7, January, 1931, pp. 329-348.

A reduction of 85 earthquakes recorded in the last $3\frac{1}{4}$ years of the "International Seismological Summary" and well observed over epicentral distances from under 20 to over 80°, has led to a fresh determination of the errors in the tables at present in use, which have been compared with those obtained in earlier investigations. It is believed that the resulting times are accurate to within about 1 second for both P and S, except possibly between 20 and 30°. The apparent velocities of P and S at short epicentral distances have been redetermined, and their probable errors are substantially reduced. There appears to be a sudden increase of velocity for waves emerging at about 20°; this corresponds to a discontinuity at a depth of about 270 kilometers, corresponding apparently to one inferred by S. Chapman from the diurnal variations of terrestrial magnetism.--Author's abstract.

(521) A KIND OF WAVES TRANSMITTED OVER A SEMIINFINITE SOLID BODY OF VARYING ELASTICITY

By Katsutada Sezawa

ulletin of the Earthquake Research Institute, Tokyo, vol. 9, part 3, 1931, pp. 310-315.

In this paper the author presents a mathematical discussion on the propaga-ion of surface waves over a semiinfinite solid body whose elastic constants are unctions of the position of a material point of the body below its free surface. ezawa confines his study to the case in which

$$\Delta = 0; \quad \omega = 0, \quad \text{and} \quad \mu = c\,(d + z_1),$$

here Δ is the dilation, ω the vertical component of the displacement, μ the odulus of rigidity, and z_1 the depth of a material point below the free sur-ace, c and d being certain constants.--W. Ayvazoglou.

(522) UN SISMOGRAPHE ACCÉLÉROMÉTRIQUE ET SES ENREGISTREMENTS

(AN ACCELERATION SEISMOGRAPH AND ITS REGISTRATIONS)

By Mishio Ishimoto

ulletin of the Earthquake Research Institute, Tokyo, vol. 9, part 3, 1931, pp. 316-332.

The author describes the construction of an acceleration seismograph and ives the results of registrations obtained with it. The following items are iscussed in this article:

1. Introduction.
2. Dimensions of the apparatus.
3. Equations of the movement.
4. Damper.
5. Friction of the pen.
6. Bending of the levers.
7. Mounting.
8. Calibrating.
9. Registrations obtained.
10. Remarks.

Nine figures illustrate the article.--W. Ayvazoglou.

(523) SEISMOMETRICAL REPORT

By N. Nasu and Ch. Yasuda

Bulletin of the Earthquake Research Institute, Tokyo, vol. 9, part 3, 1931, pp. 374-386.

The object of this new column in the bulletin is to report all earthquakes that have been registered at stations in the seismic network established over the Kwantō districts by the Earthquake Research Institute of the Tokyo Imperial University. In the case of important earthquakes, their seismograms will be reproduced.

The tables added to the article show:

1. Seismological stations in the Kwantō districts.

2. Instruments and their characteristics used in each station.

3. Appreciable earthquakes in Tokyo for the period January 1 to March 31, 1931.

4. Important distant earthquakes as observed in Tokyo.

5. Preliminary notes on the strong earthquake of June 17, 1931.

A reproduction of 11 seismograms with reference to the instruments and their constants is added to the report.--W. Ayvazoglou.

(524) NOUVELLES OBSERVATIONS SUR L' ONDE PL

(NEW OBSERVATIONS ON THE PL-WAVE)

By O. Somville

Gerlands Beiträge zur Geophysik, Leipzig, vol. 33, No. 2, 1931, pp. 31-34.

New investigations on the PL-wave show, according to the author, that this wave has been identified on the seismograms registered in the northern part of the Atlantic and in Iceland, but that the times of propagation are systematically less than those for the epicenters in the south of Europe.

The observations are summed up in a table and five seismograms added to the article.

Previous investigations on the PL-wave were described by Somville in Gerlands Beiträge zur Geophysik, vol. 27, No. 3-4, 1930, and vol. 29, No. 2, 1931 (see Geophys. Abs. 21, p. 9, and 26, p. 143).--W. Ayvazoglou.

4. ELECTRICAL METHODS

(525) APPLYING THE MEGGER GROUND TESTER IN ELECTRICAL EXPLORATION

By Bela Low, Sherwin F. Kelly, and William B. Dreagmile

reprint, American Institute of Mining and Metallurgical Engineers, New York,
12 pp., 1931.

Field procedures carried out with the megger ground tester are described. he procedures are demonstrated by means of simple laboratory experiments. igures obtained in these experiments are given in two tables. The effect on esistance readings of varying depths of conductive and resistant sheets is hown in a diagram. The authors conclude:

> The study of certain types of geological problems may often be facilitated and speeded, with a saving in expense, by employing the megger ground tester for making reconnaissance resistivity studies. Problems involving such things as mapping subsurface contours and determining depth of overburden, tracing faults, contacts, and intrusions, following key horizons and investigating simpler questions of ore occurrence come to mind as being frequently amenable to treatment by electrical studies, to which the megger ground tester might profitably be applied on many occasions.--W. Ayvazoglou.

(526) DE L' INTERPRÉTATION DES MESURES GÉOELECTRIQUES

(ON THE INTERPRETATION OF GEOELECTRICAL MEASUREMENTS)

By Arnaldo Zabelli

' Écho des Mines et de la Métallurgie, Paris, vol. 59, No. 3073, 1931,
pp. 639-642.

The necessity of creating the best rules for giving to the term "interpre-ation" of geophysical data the most limited and most accurate signification s discussed.

Zabelli considers this point to be of great importance owing to the fact hat the practical difficulties of interpreting the geophysical results constitute a serious technical obstacle to a generalization of these results.

The author examines the various aspects contributed to this work at he present time.--W. Ayvazoglou.

(527) A GEOPHYSICAL SURVEY ON THE SANTA RITA OREBODY

By Lyle H. Henderson

The Mining Congress Journal, Washington, D.C., vol. 17, No. 2, February, 1931, pp. 77-79 and 87.

The author describes an experimental electrical survey on the Santa Rita orebody to determine the adaptibility of a resistivity method to the locating and outlining of large low-grade deposits of disseminated sulphide mineralization. The geophysical work was conducted independently and without knowledge of the drill-hole data. Geology of the area is briefly outlined. The results obtained from the resistivity survey of the Estrella area, which lies immediately to the southwest of the Chino pit, are described and compared with the data compiled from drill-holes and supplied by the Chino geology department. The two profiles are shown in a figure. The results of this experimental survey are considered to be exceedingly gratifying from the commercial as well as from the research viewpoint. The ease and accuracy with which disseminated mineralization may be localized by the employment of geophysics would seem, according to the author, to establish beyond question an indispensibility for these methods in the prospecting and exploration of this type of mineralization.--W. Ayvazoglou

5. RADIOACTIVE METHODS

(528) EINE NEUE METHODE DER SELBSTTÄTIGEN KOINZIDENZZÄHLUNG

(A NEW METHOD OF AUTOMATIC COINCIDENCE COUNTING)

By J. N. Hummel

Zeitschrift für Physik, Berlin, vol. 70, No. 11/12, 1931, pp. 775-787.

A connection for the direct measurement and automatic registration of coincidence impulses which appear in several countertubes is described. The counters are disposed in a common circuit and are connected in series. The method of working of the arrangement is described and its advantages and disadvantages discussed.--Author's abstract translated by W. Ayvazoglou.

(529) ÜBER DIE RADIOAKTIVITÄT DER GESTEINE AUS DEM URANPECHERZBERGBAUREVIER VON ST. JOACHIMSTHAL IN BÖHMEN

(ON THE RADIOACTIVITY OF ROCKS FROM THE URANIC PITCH-ORE MINING DISTRICT OF ST. JOACHIMSTHAL IN BOHEMIA)

By F. Behounek and W. Santholzer

Gerlands Beiträge zur Geophysik, Leipzig, vol. 33, No. 2, 1931, pp. 60-69.

A series of analyses of various rocks constituting the geologic formation of the St. Joachim Valley were made by the authors. The method and apparatus used are described.

According to the results of the preliminary work it was established that he radioactivity was very high, of the order of up to 10^{-10} gram of the adium element per 1 gram of rock, especially for samples taken near the itch-blende deposits. A figure of the apparatus and a table showing the adioactivity of various rocks taken from the St. Joachim Valley are given.

Although the results are of great interest the number of analyses made an not, in the opinion of the authors, be considered sufficient to draw efinite conclusions. Further analyses on a larger scale are necessary.-- . Ayvazoglou.

6. GEOTHERMAL METHODS

(530) THE THERMAL EFFECTS OF BLANKETING BY SEDIMENTS

By Harold Jeffreys

onthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 2, No. 7, January, 1931, pp. 323-329.

The problem investigated in this article concerns the thermal effect of dding to the crust of the earth, in its normal thermal state, a thick deposit f sediments. The conduction of heat into the sediments will evidently raise he temperature at their base, and in time the normal temperature gradient, r something very near it, will be established throughout them.

A detailed mathematical discussion of the problem is given.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(531) VULKANOLOGIE UND GEOPHYSIK

(VOLCANOLOGY AND GEOPHYSICS)

By Immanuel Friedländer

Gerlands Beiträge zur Geophysik, Leipzig, vol. 32, No. 1, 1931, pp. 113-133.

Taking into consideration that almost all branches of physics are onnected with the research concerning the problems of volcanology the author xpresses the opinion that a wide and interesting field of work in this domain s offered, also for geophysicists.

Application of the following physical methods of investigation of olcanological problems is discussed:

1. Topographic, photographic, and geodetical survey.
2. Gravimetrical measurements.
3. Magnetic measurements.
4. Meteorological observations.
5. Seismological observations.
6. Accoustic phenomena.
7. Thermal measurements.
8. Optical investigations.
9. Electrical investigations.--W. Ayvazoglou.

(532) A DISCUSSION OF THE RELATIONSHIP BETWEEN GEOLOGY AND GEOPHYSICS

By Dart Wantland

The Colorado School of Mines Magazine, Golden, vol. 21, No. 10, 1931, pp. 31-32, 43 and 45.

The purpose of this article, as outlined by the author, is "to sketch the background of each main method of geophysical prospecting, point out its connection with geology, and thus bring out the thought that geophysics is, like the petrographic microscope, a means of obtaining geologic information."

Some examples in which geophysical prospecting has proved to be a useful aid to geology are mentioned. The necessity of expressing the measurements obtained by geophysical instruments in terms of geology is emphasized. Useful conclusions and results are possible because the forces measured are functions of local geologic conditions and the connection between the forces measured and geology is understood. Hence geophysics is a new tool -- another means of gaining geologic information.--W. Ayvazoglou.

(533) THE IMPERIAL GEOPHYSICAL EXPERIMENTAL SURVEY

By T. W. Edgeworth David

Chemical Engineering and Mining Review, Melbourne, vol. 23, No. 274, 1931, pp. 367-372.

This article contains a review of the report of the Imperial Geophysical Experimental Survey published by A. B. Broughton Edge and T. H. Laby under the title "Principles and Practice of Geophysical Prospecting" (see Geophys. Abs. 30).

David observes that the primary purpose of the survey being to test methods rather than to open up new fields, a choice had to be made of (1) areas suited to the application of more than one geophysical method; (2) areas where the degree of accuracy of the geophysical survey could be practically tested by boring or sinking shafts, or reference to an adjacent, already established, mine or bore; and (3) areas which in the aggregate furnished as much variety as possible in the nature of the minerals for which it was intended to prospect, as, for example, metallic minerals, coal, oil, graphite, water, etc., as well as variety in the climatic and other geographical conditions of the area to be tested.

The fields investigated by the magnetic method, gravimetric method, electrical methods, and seismic method are mentioned and the results are discussed. Under the last heading, "The future of geophysical prospecting," the author observes that the results of the two years' work in Australia has shown that for the requirements in this country the more rapid and more approximate methods of geophysical prospecting should precede the slower and more precise methods. The seismic, the magnetic, and the electrical methods being all much more rapid than the gravimetric.--W. Ayvazoglou.

(534) A COMMENT UPON PRESENT-DAY APPLIED GEOPHYSICS

By F. W. Lee

U.S. Bureau of Mines Information Circular 6496, 1931, Washington, D. C., 5 pp.

A brief comment on the question of where the subject of applied geophysics stands from the viewpoint of (1) the physicist, (2) the mathematician, and (3) the geologist. Gravitational, magnetic, electrical, seismic, geothermal, radioactive, and self-potential methods are discussed with regard to this question.--W. Ayvazoglou.

(535) ÜBER GEOPHYSIKALISCHE UNTERSUCHUNGEN IM SALZDOM GEBIET WESTLICH CELLE UND IM KÜSTENGEBIET VON TEXAS UND LOUISIANA

(ON THE GEOPHYSICAL INVESTIGATIONS CARRIED OUT IN THE SALT-DOME AREA WEST OF CELLE AND IN THE GULF COAST OF TEXAS AND LOUISIANA)

By Carl Schmidt

Petroleum Zeitschrift, Berlin, vol. 27, No. 21, 1931, pp. 373-375.

This is a summarized report of two articles presented by the author at the Institution of Petroleum Technologists in London under the titles: "The salt dome area west of Celle" and "Geophysical investigations carried out in the salt-dome areas of the Gulf Coast of Texas and Louisiana."

The articles were published in The Petroleum Times, London, vol. 25, No. 638, 1931, pp. 508-509 (see Geophys. Abs. 28, pp. 211 and 213).

The present article is illustrated by two maps showing (1) the salt-dome area of Celle and (2) the salt domes and borings in the Hannover oil district. A bibliography on the subject is added.--W. Ayvazoglou.

(536) LA BAGUETTE ET LE PENDULE DANS LES RECHERCHES MINIÈRES

(THE DIVINING-ROD AND THE PENDULUM IN PROSPECTING FOR MINERALS)

By J. Lafond

L'Écho des Mines et de la Métallurgie, Paris, vol. 59, Nos. 3079 and 3080, 1931, pp. 818-823 and 851-856.

Operations carried out with the divining-rod for prospecting for water and minerals are described. The author concludes the first part of his article as follows:

> These multiple illusions and numerous physical errors make the indications given by the men operating the divining-rod entirely incredible, especially if minerals are concerned. In fact, the man can never disclose the reasons for his error, thus can never avoid them in future.

The second part of the article deals with some operations carried out by these men with a pendulum. Several men well known in the history of the use of the divining rod are mentioned.--W. Ayvazoglou.

(537) KORRELATIONEN DER MONATLICHEN ANOMALIEN DER LUFTTEMPERATUR AUSGEWAHLTER POLE MIT JENEN ANDERER ORTE

(CORRELATION OF MONTHLY TEMPERATURE ANOMALIES OF THE AIR OF SOME SELECTED POLES WITH THOSE IN OTHER PLACES)

By Leo Wenzel Pollak

Gerlands Beiträge zur Geophysik, Leipzig, vol. 33, No. 2, 1931, pp. 70-111.

The correlations of simultaneous and successive anomalies of temperature in different parts of the terrestrial surface in the extreme months and the annual average for three correlative poles are found and represented cartographically. Besides these are given the results of the Fourier analysis of anomalies of temperature (1887-1916) for January, July, and the whole year.--Author's abstract.

(538) THE USE OF GEOPHYSICS IN GOLD MINING

By J. J. Jakosky

The Mining Journal, Phoenix, Ariz., vol. 15, No. 6, 1931, pp. 5-7 and 37.

Important applications of geophysics to gold mining are constantly being made, and definite results obtained. In a great majority of cases, the geophysical work is conducted at only a fraction of the cost of other methods of development. An increasing number of mining companies are employing the geophysical work as a definite step in the development program. The chief rôle of the geophysical work in placer mining may be summarized as follows: (1) Location of the bedrock and subsurface stream outline, and (2) concentrations of "black sands" carrying the better gold values. A few drill-holes or shafts, placed in due regard for the geophysical-geological findings, allow the property to be proved up with a minimum expenditure of time and money. It has been repeatedly shown that the geophysical work effects a vital saving of money by minimizing useless drilling or other development work.--Author's abstract.

9. NEW BOOKS

(539) GEOLOGICAL SURVEY, CANADA, DEPARTMENT OF MINES, MEMOIR 165. STUDIES OF GEOPHYSICAL METHODS, 1928 AND 1929

The book is issued by the Geological Survey (W. H. Collins, director) in 1931, 225 pp. 66 illustrations, 11 plans. Price, 45 cents.

Part I. Investigations made in cooperation with the Radiore Co. of Canada (Ltd.), Schlumberger Electrical Prospecting Methods, and Swedish American Prospecting Co. of Canada, by L. Gilchrist and J. B. Mawdsley. This part contains seven chapters.

Part II. Geophysical investigations at the Mammoth Cave, Kentucky, and in Sudbury Basin District, Ontario. By A. S. Eve, D. A. Keys, H. G. I. Watson, J. H. Swartz, and J. B. Mawdsley. Three chapters.

Part III. Experiments in electrical exploration made in the summer of 1929, by L. Gilchrist.

Part IV. Geophysical survey of the Hull-Gloucester and Hazeldean faults, by A. H. Miller, C. A. French, and M. E. Wilson. Four chapters. The main part of the book concerns information on prospecting by electrical methods. A few chapters deal with magnetic and gravimetrical methods.

(540) METEOROLOGISCHES TASCHENBUCH (METEOROLOGICAL POCKET-BOOK). VERLAG DER AKADEMISCHEN VERLAGSGESELLSCHAFT m.b.H., LEIPZIG, 1931

By C. Kassner, K. Keil, E. Kleinschmidt, K. Knoch und G. Stüve.

Published by F. Linke, Frankfurt a.M. 316 pp., 43 figs. Price: stitched, R.M. 13, bound R.M. 15.

Contents: Chapter I, Meteorological historical tables, by C. Kassner; Chapter II, Meteorological Institutes, by F. Linke; Chapter III, The most important meteorological periodicals, by F. Linke; Chapter IV, List of radio stations sending weather reports regularly, by K. Keil; Chapter V, Weather-report code, by K. Keil; Chapter VI, Elements of theoretical meteorology, by G. Stüve; Chapter VII, Meteorological instruments and methods of observation, by E. Kleinschmidt; Chapter VIII, Monthly and yearly mean values of air-pressure, temperature and precipitation, by K. Knoch; Chapter IX, Constants and tables, by F. Linke.

10. PATENTS

This information circular contains abstracts by W. Ayvazoglou from German patents concerning seismic methods of geophysical prospecting (for German patents concerning electrical, gravimetrical, and magnetic methods see Geophys. Abs. 27 and 29).

Copies of the patents listed in the circulars may be procured from Deutsches Reich, Reichspatentamt, Berlin, Germany.

(541) ERSCHÜTTERUNGSMESSER

(APPARATUS FOR MEASURING VIBRATIONS)

Dr. Ludger Mintrop of Bochum

303344 Patent issued June 18, 1920.

This invention concerns a pendulum meant for measuring or observing artificial vibrations. It consists of an arrangement by which the oscillations of the pendulum are transferred to a mirror or a surface bearing a mirror; the latter is provided with a small iron pin, influenced by the field of a magnet, by which the mirror is constantly brought back to its original position during the oscillations.

Claims allowed - 1.

(542) ERSCHÜTTERUNGSMESSER

(APPARATUS FOR MEASURING VIBRATIONS)

Addition to patent 303,344

Dr. Ludger Mintrop of Bochum

303,345 Patent issued June 18, 1920.

This is an addition to patent 303,344 showing an improvement on the original invention. According to this patent the bearer of the mirror is developed into a magnet and the friction piston is made of iron; thus an attraction between them is obtained.

Claims allowed - 1.

(543) GERÄT MIT MAGNETNADEL FÜR ERDBEBENWARTEN UND WETTERDIENST

(APPARATUS WITH MAGNETIC NEEDLE FOR SEISMIC OBSERVATIONS AND WEATHER-STATIONS)

Wilhelm Fricke of Halberstadt

365,556 Patent issued Dec. 18, 1922.

The invention discloses an apparatus by the swinging movements of which electric contacts are obtained. These contacts result on the one hand in a bell ringing, and on the other hand in a registration of the oscillations of the magnetic needle on a drum. The registration of the magnetic needle deviation produces first a "small alarm" and later a "big alarm."

Claims allowed - 2.

(544) GERÄT MIT MAGNETNADEL FÜR ERDBEBENWARTEN UND WETTERDIENST

(APPARATUS WITH MAGNETIC NEEDLE FOR SEISMIC OBSERVATIONS AND WEATHER-STATIONS)

Addition to patent 365,556

Wilhelm Fricke of Halberstadt

365,557 Patent issued Dec. 18, 1922.

An improvement and further development of the original patent 365,556 is disclosed by which interruption in the ringing of the bell is prevented.

Claims allowed - 1.

(545) ERSCHÜTTERUNGSMESSER

(APPARATUS FOR MEASURING OSCILLATIONS)

"Erda" Akt.-Ges. and Dr. Carl Mainka of Göttingen

373,025 Patent issued April 6, 1923.

This invention concerns apparatus for measuring oscillations provided with three pendulum and recording devices. The pendulums consist of pendulum bars and pendulum weights and are suspended from wires tightened horizontally between supporting posts. The devices assigned for registering the oscillations in three dimensions (width, depth, and height) are similar. Each device is, besides, provided with a pencil for registering on smoked paper, as well as with mirrors for registering the deviation of a light ray upon sensitive paper.

Claims allowed - 2.

(546) GERÄT ZUR BEOBACHTUNG VON ERSCHÜTTERUNGSWELLEN

(APPARATUS FOR OBSERVING OSCILLATION WAVES)

Reinhard Reeh of Koblenz-Neuendorf

398,311 Patent issued July 7, 1924.

The apparatus described in this patent is characterized by an arrangement in which the fixed mirror is replaced by the reflecting surface of a liquid, as well as by the arrangement of transmission by which the oscillations produce the movement of the liquid.

Claims allowed - 6.

(547) GERÄT ZUM BEOBACHTEN VON ERSCHÜTTERUNGSWELLEN

(APPARATUS FOR OBSERVING OSCILLATION WAVES)

Addition to patent 398,311

Reinhard Reeh of Koblenz-Neuendorf

399,179 Patent issued July 21, 1924.

The improvement on the original patent 398,311 consists, according to this patent, mainly in the following:

The movable parts of the seismic pendulum connected with the oscillating bodies, and the steady mass of the pendulum supported by an elastic body, enclose a hollow space the capacity of which changes corresponding to the shocks produced by oscillations.

Claims allowed - 8.

(548) ERSCHÜTTERUNGSMESSER ODER SEISMOGRAPH

(APPARATUS FOR MEASURING OSCILLATION OR SEISMOGRAPH)

Dr. Richard Ambronn of Göttingen

423,972 Patent issued March 1, 1926.

According to this invention the elasticity of the apparatus which is usually obtained by mechanical means (springs) or gravitation (pendulums) is produced mostly by electromagnetic effects. This makes the apparatus simpler, besides the utilization of the energy necessary for registration is especially favorable as the friction forces are eliminated.

Claims allowed - 5.

(549) ERSCHÜTTERUNGMESSER ODER SEISMOGRAPH

(APPARATUS FOR MEASURING OSCILLATION OR THE SEISMOGRAPH)

Addition to patent 423,972

Dr. Richard Ambronn of Göttingen

423,973 Patent issued Jan. 14, 1926.

In this addition to the original patent 423,972 the inventor increases the electromagnetic effect by adding an iron body (a tube or a similar body) which also lies in the field of the magnetizing coil and toward which the magnetic or magnetizable mass of the oscillator is moved.

Claims allowed - 5.

(550) VERFAHREN ZUR ERMITTELUNG VON LAGE UND GESTALT VON NUTZBAREN LAGERSTÄTTEN ODER GESTEINSSCHICHTEN MITTELS BEOBACHTUNG VON SCHALLWELLEN

(METHOD FOR DETERMINING THE POSITION AND THE SHAPE OF DEPOSITS OR ROCK LAYERS BY OBSERVATION OF SOUND-WAVES)

Piepmeyer and Co. Komm-Ges. of Kassel-Wilhelmshöhe

479,724 Patent issued July 22, 1929.

The inventor describes a method for determining the position and the shape of deposits or rock layers by observing sound waves propagated inside of the earth-crust. The method is based on the change in the intensity of the sound waves produced artificially at certain intervals. An unlimited number of time marks necessary for the observation can be produced.

Claims allowed - 1.

(551) VERFAHREN ZUR SEISMISCHEN BODENFORSCHUNG

(SEISMIC METHOD OF PROSPECTING)

Dr. Richard Ambronn of Göttingen

495,577 Patent issued April 9, 1929.

The nature of the present invention, concerning seismic method of prospecting, is based on the registration at the receiving stations of the elapsed time of the acceleration values and not on the registration of the motion curve or the velocity curve.

Claims allowed - 5.

(552) VERFAHREN ZUR ERDERFORSCHUNG MITTELS PERIODISCHER ELASTISCHER WELLEN

(METHOD OF PROSPECTING BY MEANS OF PERIODIC ELASTIC WAVES)

Dr. Richard Ambronn of Göttingen

495,750 Patent issued April 24, 1930.

The invention discloses a method of prospecting by means of periodic elastic waves in which the periodic waves of various continuously or discontinuously changed frequency and form of oscillation, and sometimes of energy are propagated from a sending station. Their influence is observed and analyzed through the resonance of oscillating underground masses dependent on the frequency and original form of oscillation of the waves at suitably distributed stations provided with seismographs.

Claims allowed - 3.

(553) GEOPHYSIKALISCHES INSTRUMENT, INSBESONDERE SEISMOGRAPH, ZUM AUFZEICHNEN GEOPHYSIKALISCHER VORGANGE UNTER DER ERDOBERFLÄCHE ODER UNTER WASSER

(A GEOPHYSICAL INSTRUMENT, PARTICULARLY A SEISMOGRAPH, FOR REGISTERING GEOPHYSICAL PROCEEDINGS UNDER THE SURFACE OF THE EARTH AND UNDER WATER)

Askania-Werke A.G. vorm. Centralwerkstatt Dessau und Carl
Bamberg-Friedenau of Berlin-Friedenau.

496,668 Patent issued April 28, 1930.

The seismograph described in this patent is provided with arrangements making it possible to obtain observations when buried in the ground or sunk in water. Before putting the instrument in the ground or water or taking it out, it can be locked so that there is no danger of damaging it. The remote action release of the locking device is performed by electricity, hydraulic or pneumatic pressure, or by some other means.

Claims allowed - 5.

(554) VERFAHREN ZUR FERNÜBERTRAGUNG DER SPRENGZEITPUNKTE VON IN DER ERDE VERGRABENEN SPRENGLADUNGEN, INSBESONDERE ZUR ERMITTLUNG DER FORTPFLANZUNGSGESCHWINDIGKEIT VON ERSCHÜTTERUNGSWELLEN IM ERDBODEN

(METHOD FOR TRANSMITTING TO A DISTANCE THE MOMENTS OF EXPLOSIONS CAUSED BY EXPLOSIVE CHARGES BURIED IN THE GROUND, ESPECIALLY FOR DETERMINING THE VELOCITY OF PROPAGATION OF OSCILLATION-WAVES INSIDE OF THE GROUND)

Askania-Werke A.-G. vormals Centralwerkstatt Dessau und Carl
Bamberg-Friedenau of Berlin-Friedenau.

(Footnote: As the inventors are mentioned: Dr. A. Ebert of Berlin and Ernst Stern of Berlin-Johannisthal)

512,834 Patent issued Nov. 17, 1930.

This invention describes a method for transmitting the moments of explosions, especially for determining the propagation of oscillation waves inside of the ground in which the records are obtained by means of light rays projected on a movable sensitive paper. According to this invention the current by which the oscillation of the oscillating system is produced is rectified by means of a rectifying connection of well-known construction.

Claims allowed - 1.

(555) VERFAHREN UND VORRICHTUNG ZUR ERMITTLUNG DER FORTPFLANZUNGSGESCHWINDIGKEIT VON ERSCHÜTTERUNGSWELLEN IM ERDBODEN

(METHOD AND DEVICE FOR DETERMINING THE VELOCITY OF PROPAGATION OF OSCILLATION WAVES INSIDE OF THE GROUND)

Askania-Werke A.G. vorm. Centralwerkstatt Dessau und Carl
Bamberg-Friedenau of Berlin-Friedenau.

514,538 Patent issued Dec. 29, 1930.

This invention concerns a method for determining the velocity of propagation of oscillation-waves inside of the ground as produced by an explosive charge buried in the ground and registering the moment of the explosion at a distant station by electrical means. According to this invention a device for closing the circuit (for example, a low-tension detonator fuse) is inserted into the main connection of the current for firing the charge. Owing to this device the current connected to the primary winding of a transformer is closed at the moment of the explosion of the charge thus exciting the secondary winding of the transformer. The moment of explosion is registered at the station of observation by means of a secondary current impulse.

Claims allowed - 4.

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